Structure, Wellspring or Content?

– a conceptual analysis of the notion of Tacit Knowledge in Knowledge Management Theory

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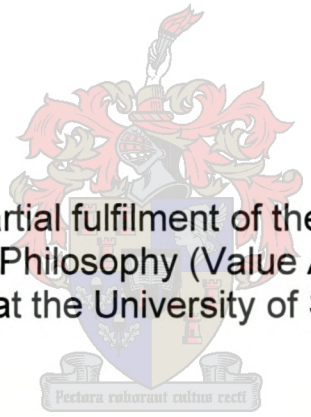

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DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature:

Date:

SUMMARY

The thesis is a conceptual analysis of the concept of tacit knowledge. The analysis consist of comparing the function of the concept of tacit knowledge in a number of selected theories from its origin in the philosophy of Michael Polanyi, through its introduction to organisation theory and its eventual application in knowledge management theory.

In the work of Michael Polanyi the concept of tacit knowledge functions as the logical structure underlying all forms of knowledge. In terms of Polanyi tacit and explicit knowledge are not two separable phenomena, because all knowledge is rooted in the act of tacit integration.

Ikujiro Nonaka adapted Polanyi's epistemology and within his framework the concept of tacit knowledge signifies the unstructured subjective realm that is the wellspring of individual creativity. Nonaka asserts firstly, that the phenomenon of tacit knowledge is a knowledge content that is distinct from explicit knowledge content and secondly, that it is possible to convert the one type of knowledge into the other. Nonaka's model includes a spiral process of interaction in which tacit knowledge is converted into explicit knowledge and back into tacit knowledge again.

The last chapter relates the conclusions reached upon the comparison of the function of the concept in the theories of Nonaka and Polanyi, with its reception in knowledge management theory. It is argued that in knowledge management the concept of tacit knowledge denotes knowledge content that cannot be communicated as information. It is also shown how Nonaka's model was integrated into a sender receiver model of communication, thus incorporating it into the information processing paradigm. It is furthermore conjectured that the concept of tacit knowledge forms part of an attempt to bridge an epistemological gap facing the discourse on organisational knowledge. Lastly, it is concluded that it appears to be impossible to use the concept of tacit knowledge to overcome this epistemological problem, without an ontological shift away from the information processing paradigm.

OPSOMMING

Die tesis is 'n konseptuele analise van die konsep van implisiete ('tacit') kennis. Die analise bestaan uit 'n vergelyking van die funksie van die konsep van implisiete kennis in 'n aantal geselekteerde teorieë, van die oorsprong van die term in die filosofie van Michael Polanyi, deur die aanpassing van die konsep in organisasie teorie, tot die toepassing daarvan in kennisbestuursteorie.

In die werk van Polanyi funksioneer die konsep as die logiese struktuur wat die onderbou van alle vorme van kennis is. In terme van Polanyi is implisiete en eksplisiete kennis nie twee aparte fenomene nie, want alle kennis is gewortel in die askie van implisiete integrasie.

Ikujiro Nonaka het Polanyi se epistemologie aangepas en binne sy raamwerk funksioneer die begrip as 'n beskrywing van die ongestruktureerde subjektiewe domein wat die bron van individuele kreatiwiteit is. Volgens Nonaka is die fenomeen van implisiete kennis eerstens 'n kennisinhoud wat onderskeibaar is van eksplisiete kennisinhoud, en tweedens dat dit moontlik is om die een soort kennis om te skakel in die ander en omgekeerd. Nonaka se model sluit 'n spiral-proses van interaksie in waarin implisiete kennis omgeskakel word na eksplisiete kennis en weer terug in implisiete kennis.

Die laaste hoofstuk belig die ontvangs van die konsep van implisiete kennis in kennisbestuursteorie teen die agtergrond van die vergelyking van die funksionering van die konsep in die teorieë van Polanyi en Nonaka. Daar word geargumenteer dat in kennisbestuursteorie die konsep verwys na kennisinhoud wat nie geredelik omgeskakel kan word na informasie en dus gekommunikeer kan word nie. Daar word getoon hoe Nonaka se model met 'n sender-ontvanger kommunikasie-model geïntegreer word en dus geïnkorporeer word in die informasie prossesseringsparadigma. Verder word gespekuleer dat die konsep gebruik word in 'n poging om 'n epistemologiese gaping in die diskoers rondom organisatoriese kennis te oorbrug. Laastens is die slotsom dat dit blyk onmoontlik te wees om die konsep van implisiete kennis te gebruik om die epistemologiese probleem op te los, sonder 'n fundamentele ontologiese skuif weg vanaf die informasie prossesseringsparadigma.

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Chapter One

THE CONCEPT OF TACIT KNOWLEDGE

Words, as is well known, are the great foes of reality.

Joseph Conrad, "Under Western Eyes."

1.1 INTRODUCTION

This thesis aims to provide an interpretative overview of the notion of tacit knowledge from its origin in philosophy to its current application in management studies in general and in knowledge management theory in particular. In order to do this the function of the concept of tacit knowledge is traced from its origin and its role in Michael Polanyi's philosophy;[1] to the introduction of the concept to economic and organisation theory through Nelson and Winter's *An evolutionary theory of economic change;*[2] and its adaptation to knowledge management theory primarily by way of the influence of Nonaka and Takeuchi's *The knowledge-creating company.*[3]

The concept of tacit knowledge has assumed a prominent role in the discourse on organisational knowledge, particularly in what arose in the nineties under the label

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1 Polanyi, M. 1958. *Personal Knowledge: Towards a Post-Critical Philosophy*. Chicago IL: University of Chicago Press

2 Nelson, RR and SG Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge MA: Harvard University Press

3 Nonaka, I and H Takeuchi. 1995. *The Knowledge-Creating Company: How Japanese Companies Manage the Dynamics of Innovation*. Oxford: Oxford University Press

of 'knowledge management.' [4] This field of inquiry assumes that knowledge is a source of competitive advantage for organisations. As a management practice it aims at the development (creation or acquisition) and diffusion of relevant knowledge to the appropriate areas of the organisation.[5]

As a relatively new field of study, knowledge management theory initially focussed little attention on its own conception of (organisational) knowledge. Knowledge management theory only became established after Nonaka provided an epistemology that seemed appropriate for conceptualising the types of knowledge that are organisational resources or sources of competitive advantage. This epistemology relies on a distinction between tacit and explicit knowledge and it soon became clear that this distinction was not used consistently. There exists a secondary discourse within knowledge management theory that is critical of the way in which the concept of tacit knowledge is employed. Most of this secondary discourse highlights the disparities or differences between Polanyi's original conceptualisation and its application in knowledge management theory.[6]

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4 Stacey, RD. 2001. *Complex Responsive Processes in Organization: Learning and Knowledge Creation*. London: Routledge; Tsoukas, H. 1996. The Firm as a Distributed Knowledge System: A Constructionist Approach, *Strategic Management Journal* 17/ Winter Special Issue: 3.

5 These practices could, and frequently do, encompass almost every organisational activity from strategy to quality control. The distinction between knowledge development (concerned with the sources of new knowledge) and knowledge diffusion (concerned with the logistics of existing knowledge) is an inherent tension in knowledge management theory that will be explored.

6 Brohm, R. Bringing Polanyi onto the Theatre Stage: A Study on Polanyi Applied to Knowledge Management, paper presented at the *Seventh International Symposium on the Management of Corporate and Industrial Knowledge*, Rotterdam, Netherlands 1997; Johnson, B, E Lorenz, and B-A Lundvall. 2002. Why All This Fuss About Codified and Tacit Knowledge?, *Industrial and Corporate Change* 11/ 2; Leonard, D and S Sensiper. 1998. The Role of Tacit Knowledge in Group Innovation, *California Management Review* 40/ 3; Schreinemakers, JF and J Essers. 1997. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management, *Knowledge Organization* 24/ 1; Snowden, D. 2002. Complex Acts of Knowing:Paradox and Descriptive Self-Awareness, *Journal of Knowledge Management* 6/ 2; Spender, JC. 1996. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications, in Moingeon, B and A Edmondson (eds.), *Organisational Learning and Competitive Advantage*. London: Sage; Stacey. *Complex Responsive Processes in Organization;* Tsoukas, H. 2002. Do We Really Understand Tacit Knowledge? Presented to Knowledge Economy and Society Seminar, LSE Department of Information Systems, 14 June 2002; Whitley, EA. 2000. Tacit and Explicit Knowledge: Conceptual Confusion around the Commodification of Knowledge. In *Department of Information Systems, LSE: Working Paper Series*. London; Whitley, EA and T Hedesstrom.

This problem of variation and even contradiction in the use of the concept of tacit knowledge is not limited to knowledge management theory. The concept of tacit knowledge is very popular in spite of (or maybe because of?) it's nebulous meaning. It has been used in many different disciplines and to many different ends. The following section provides an overview of the wide application of the concept of tacit knowledge and is evidence of the considerable variation in its function.

1.2 OVERVIEW

Polanyi introduced the concept of tacit knowledge into academic discourse in his arguments relating to the nature of perception. From these origins in philosophy of mind, he applied the concept in the area of philosophy of science; using the concept of tacit knowledge to show that there is a common structure to all kinds of knowledge, thus undermining some of the commonly held assumptions regarding the difference between theoretical and practical knowledge.

As conceptualised by Polanyi the phenomenon of tacit knowledge involves a merging of skills and presuppositions into a complex whole that cannot be taken apart in analysis. This conflation of presuppositions and cognitive skills lies at the basis of the eventual varied applications of the concept. This introductory section will demonstrate that the concept of tacit knowledge operates in a range of, sometimes contradictory, functions in many different theories.

The concept of tacit knowledge continues to exert an influence on themes that derive from the philosophy of mind, for instance in the study of artificial intelligence. Thinkers who were sceptical of the artificial intelligence programme used the concept of tacit knowledge to refer to those elements of human intelligence that supposedly cannot be represented as algorithms.[7]

2000. What Is Meant by Tacit Knowledge? Towards a Better Understanding of the Shape of Actions. In *Department of Information Systems, LSE: Working Paper Series*. London

[7] Hofstader, D. 1979. *Gödel, Escher, Bach: An Eternal Golden Braid*. New York NY: Basic Books

Sociologists who are primarily interested in the sociology of science and technology were quick to make use of Polanyi's contribution to the philosophy of science. This group of social researchers called their method the "social studies of science."[8] A prominent exponent of this approach is probably Harry Collins[9] whose study of scientists at work highlighted the fact that many of the conventions used by scientists during their experiments are never formalised or codified and are therefore instances of tacit knowledge.[10] Similarly MacKenzie looks to the concept of tacit knowledge to explain why the Soviet nuclear weapons programme, which used large amounts of stolen specification and data obtained by spies, actually took longer than the American effort.[11]

In essence this 'cognitive approach' to sociology of science is a critique of the more traditional sociological approaches that try to explain advances in science and technology in terms of structural factors such as institutional settings, subsidy structures, financial resources and the like. Instead, the social studies of science writers focus on the sociological forces that influence the cognitive aspects of scientific work. The central point made by these scholars is that scientific skills are not transmitted through the medium of written words or formulae, but rather through the medium of socialised apprenticeships.[12] The concept of tacit knowledge

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8 Also referred to as the *Sociology of Science and Technology* or the *Sociology of Science Studies*. For an overview of such approaches to science, one can turn to Fuller, S et al. (eds.), 1989. *The Cognitive Turn: Sociological and Psychological Perspectives on Science*. Dordrecht: Kluwer Academic

9 Collins, HM. 1990. *Artificial Experts: Social Knowledge and Intelligent Machines*. Cambridge MA: MIT; Collins, HM. 1993. The Structure of Knowledge, *Social Research* 60/ 1.

10 One of Collins' studies was on the development of a new laser. Scientists working on this project never explicitly defined the exact length of the "short" leads between the capacitors and the electrodes in the laser, and as a result some laboratories failed to build operational lasers. Collins argued that knowledge such as what "short" means in a laboratory, is learned socially and becomes a tacit skill in a scientist's makeup.

11 MacKenzie, D and G Spinardi. 1995. Tacit Knowledge, Weapons Design and the Uninvention of Nuclear Weapons, *American Journal of Sociology* 101/ 1.

12 This insight has major implications for government policies regarding science and technology spending, because it suggests that regional innovative capacity is linked to a *social* milieu of innovation. For examples of this kind of argument see the following two papers: Lawson, C and E Lorenz. 1999. Collective Learning, Tacit Knowledge and Regional Innovative Capacity, *Regional Studies* 33/ 4; Nightingale, P. 1998. A Cognitive Model of Innovation, *Research Policy* 27.

is used by these writers to link cognition with socialisation, thus grounding some cognitive elements in the socialised skill set of scientists.

Polanyi modelled his idea of the common (tacit) structure underlying all forms of knowledge on the structure of perception as depicted in *Gestalt* psychology. It is thus no surprise that the concept of tacit knowledge found an eager reception in some quarters of psychology; in particular experimental psychology and pedagogy (learning/teaching psychology). Naturally, if it is possible to know more than one can tell, the question is to what extent we learn without being aware of what we learn. Reber[13] calls this "implicit learning" and argues that in certain cases new knowledge can be acquired without conscious effort or even intent.

The inability to express in words precisely what is meant, confronted researchers at the *Harvard Lab for Computer and Spatial Analysis* during the development of *Geographic Information Systems*. They found that the problem of modelling 'surfaces' involved more than the technical problem of processing and displaying geographical data. They came to the conclusion that those involved in teasing out the meanings of the term 'surfaces' developed tacit knowledge (shared understandings) that facilitated the development process.

> The term, 'surface,' came to take on new and sometimes abstract meanings. The language used to describe 'surfaces' was rooted in tacit knowledge and more formal mathematics. The mixing of different forms of language, both verbal and written, allowed the passing of abstract and sometimes difficult meanings.[14]

The concept of tacit knowing also found application in health care and diagnosis theory, since tacit knowing relies on the integration of particulars into a whole, as in

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[13] See for instance: Reber, AS. 1989. Implicit Learning and Tacit Knowledge, *Journal of Experimental Psychology* 118; Reber, AS. 1993. *Implicit Learning and Tacit Knowledge: An Essay on the Cognitive Unconscious*. Oxford: Oxford University Press

[14] McHaffie, P. 2000. Surfaces: Tacit Knowledge, Formal Language, and Metaphor at the Harvard Lab for Computer Graphics and Spatial Analysis, *International Journal of Geographical Information Science* 14/ 8: 755.

the case of diagnosing a medical condition.[15] One paper on the subject regards the way in which nurses rely on tacit knowledge that enable them to make more accurate assessments of the condition of specific patients under their care.[16]

It is therefore clear that the concept of tacit knowledge has found a wide and eager reception in many theories across various disciplines. What is problematic is the fact that the concept of tacit knowledge is used in a variety of different ways, resulting in a lack of conceptual clarity.

1.3 CRITIQUE OR ORTHODOXY?

There is however a unifying factor. It is striking that in most of the disciplines where the concept of tacit knowledge took root, the concept seem to operate as the basis for a *critique* of established theory. As a result it remains a marginal or peripheral concept in most of the fields of study where it has been employed. This is even true of the 'post-critical philosophy' of its originator. Polanyi's philosophical project is in essence a critique of the (then) dominant view of 'objectivism' in philosophy of science.[17] In a similar way social studies of science writers use the concept of tacit knowledge as the basis for a critique of an institutional approach to sociology of science,[18] evolutionary economists use it as the basis for a critique of neo-classical economics,[19] artificial intelligence sceptics use it as the basis for a critique of an algorithmic worldview, and the dynamic capabilities approach use the concept as a

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15 Polanyi was a medical practitioner himself and he used the example of medical diagnosis to explain the phenomenon of tacit knowledge. See, Polanyi. *Personal Knowledge*: 88-89.

16 Clinton, M. 1998. On Reflection in Action: Unaddressed Issues in Refocussing the Debate on Reflective Practice, *International Journal of Nursing Practice* 4/ 3.

17 Grene, M (ed.), 1969a. *Knowing and Being: Essays by Michael Polanyi*. London: Routledge: ix-xvii.

18 See, Fuller et al. (eds.). *The Cognitive Turn*

19 Nelson and Winter. *An Evolutionary Theory of Economic Change*: 73.

the basis for critique of the dominant view of the firm as a knowledge processing system, rather than a knowledge creating system.[20]

However, the work of Ikujiro Nonaka marks a turning point in the theoretical history of the concept of tacit knowledge. It was Nonaka's theory of organisational knowledge creation that gave the concept of tacit knowledge a new lease of life. Largely due to the popularity of Nonaka's theory in organisation and management thinking, the field of knowledge management theory affords a *central position* to the concept of tacit knowledge. Tsoukas remarks the following about the use of the concept of tacit knowledge in knowledge management theory:

> Ever since Nonaka and Takeuchi have published their influential *The Knowledge-Creating Company*, it is nearly impossible to find a publication on organisational knowledge and knowledge management that does not make a reference to, or use the term 'tacit knowledge.'[21]

It is not only a question of popularity. The concept of tacit knowledge appears to be the starting point for conceptualising the 'knowledge' that is to be the object of knowledge management practices. In other words, the distinction between tacit and explicit knowledge has become the *default epistemology* for knowledge management theory. Stacey underscores this assessment by referring to literature that use the concept of tacit knowledge, as the "mainstream literature on organisational learning/knowledge creation."[22] He argues that "it has now become commonplace for academics, managers, leaders and consultants to think and talk either within its terms or in critique of it."[23] From this follows that the discourse on the merits of the concept of tacit knowledge has the greatest relevance in terms of knowledge management

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[20] Teece, DJ. 1998. Capturing Value from Knowledge Assets: The New Economy, Markets for Know-How, and Intangible Assets, *California Management Review* 40/ 3; Verona, G and D Ravasi. 2003. Unbundling Dynamic Capabilities: An Exploratory Study of Continuous Product Innovation, *Industrial and Corporate Change* 12/ 3.

[21] Tsoukas. Do We Really Understand Tacit Knowledge?: 3.

[22] Stacey. *Complex Responsive Processes in Organization*: 13.

[23] Stacey. *Complex Responsive Processes in Organization*: 13.

theory, because it stands central in this body of theory. Hence the focal point of this thesis centres on the way in which the concept of tacit knowledge functions in knowledge management theory.

1.4 FOCUS AND DELIMITATION

To properly understand the implications of assigning the concept of tacit knowledge a central role in knowledge management theory, the thesis will position the notion of tacit knowledge against the backdrop of certain selected theories where the concept played a key role. In other words, a single strand will be lifted from the broad discourse employing the concept of tacit knowledge. This is the strand running from Polanyi, through the appropriation of his concept by economists, to its adaptation by organisation theorists, up until its being made the basis for certain approaches to corporate knowledge management. The idea is not to map the entire range of uses and accordingly discussions unrelated to the significance of tacit knowledge for organisational knowledge will be left aside.

The two main moments of exposition are necessarily the work of Polanyi and Nonaka. Polanyi is chosen as starting point, not only because he coined the term of tacit knowledge, but also because Nonaka (and most knowledge management theorists that employ a distinction between tacit and explicit knowledge), constantly refer to Polanyi as a primary source. As pointed out earlier, there is also a growing body of literature reviewing Nonaka's epistemological commitments in terms of Polanyi's original conceptualisation of tacit knowledge.[24]

The other central author is Ikujiro Nonaka, as his theory brought the concept of tacit knowledge from the more or less theoretical fringe to the theoretical grounding of

[24] This thesis differ from most of these approaches in that Nonaka or the knowledge management theorists are not assessed in terms of Polanyi. This thesis does not assume any correct or authoritative meaning of the concept of tacit knowledge. It simply compares the way in which the concept functions, instead of trying to establish criteria for the 'correct conceptualisation' or 'legitimate application' of the concept.

mainstream knowledge management. [25] Nonaka is widely recognised as one of the primary knowledge management theorists and because his views are so influential, his theory will be analysed in depth. Nonaka is not only responsible for the popularisation of the concept of tacit knowledge in management studies, but his theory also straddles knowledge management theory and the rest of organisation theory.[26] Furthermore, a significant number of knowledge management writers claim to be using Nonaka's epistemology, which in turn relies on the dichotomy between tacit and explicit knowledge.

The disparities with and modifications to Polanyi's conceptualisation of tacit knowledge implied by Nonaka's view will be clarified by tracing incremental changes to the concept through evolutionary economics and dynamic firm capabilities approaches to organisations. The argument will be more than just an overview of these differences in conceptualisation, as it will also show how these differences came about and why, by highlighting the minor (yet cumulative) adjustments to the concept as it is continually applied in related, but different, theoretical settings.

Finally the implications for knowledge management theory and the differences between Polanyi and those knowledge management writers following Nonaka will be highlighted against the backdrop of the theoretical issues raised by the comparison of the function of the concept in the theories of Nonaka and Polanyi. This comparison enables one to understand a particular fault-line in knowledge management theory (that has been commented on extensively by writers) arguing that knowledge management theory lacks a coherent epistemology.[27]

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[25] Nonaka and Takeuchi. *The Knowledge-Creating Company*

[26] In chapter two it is argued that, although in retrospect Nonaka produced a classic in knowledge management literature, his theory originated from the resource-based and dynamic capabilities approaches to the theory of the firm.

[27] Snowden. Complex Acts of Knowing; Stacey. *Complex Responsive Processes in Organization;* Von Krogh, G, J Roos, and K Slocum. 1996. An Essay on Corporate Epistemology, in Von Krogh, G and J Roos (eds.), *Managing Knowledge: Perspectives on Cooperation and Competition*. London: Sage

1.5 STRUCTURE, WELLSPRING, AND CONTENT

It will be argued that in the case of Polanyi, the concept of tacit knowledge primarily stands for the *structure* of knowing. The content of knowing is the product of the integrative structure and hence interwoven with the structure. Since this tacit structure underlies all knowing, it makes little sense to think of the phenomenon of tacit knowledge as content that could be converted into an explicit form. Furthermore, it will be shown that the notion of knowledge transfer between individuals (a fundamental assumption of mainstream knowledge management theory) cannot be grafted onto Polanyi's conception of knowledge as arising from the integration of subsidiary particulars.

It will be shown that Nonaka did not employ the concept of tacit knowledge according to the original technical meaning of the concept as used by Polanyi. It will be argued that Nonaka employs the concept of tacit knowledge to signify the unstructured subjective realm that is the *wellspring* of individual creativity. An important element of Nonaka's conceptualisation is the assumption that the phenomenon of tacit knowledge is also a knowledge *content* that can be converted in explicit knowledge and back again through a spiral process of interaction that is firstly a series of knowledge conversions, but secondly also an amplification process that turns individual insights into organisational knowledge.

The last chapter will then relate the conclusions reached regarding the functioning of the concept of tacit knowledge in the theories of Polanyi and Nonaka, with the reception of the concept in knowledge management theory.

Firstly, it will be argued that the function of the concept of tacit knowledge in knowledge management theory seems to be closely linked to the way they distinguish between information and knowledge. In other words, the concept of tacit knowledge signifies the knowledge *content* that cannot be communicated as information.

Secondly, it is shown how Nonaka's spiral process of knowledge interaction was integrated into a sender-receiver model of communication, thus rooting the concept

of tacit knowledge in the information processing paradigm that Nonaka's theory proposed to criticise.

Thirdly, it is conjectured that knowledge management writers use the concept of tacit knowledge in an attempt to bridge an epistemological gap left by the fact that science-based epistemological discourse cannot directly be applied to organisational knowledge. It is argued that the concept of tacit knowledge is attractive to knowledge management writers, because it provides a way to ground organisational cognition in organisational practices. This acts as an epistemological stop-gap measure, which makes it possible to temporarily solve the epistemological problem posed by organisational knowledge without genuinely engaging it.

Lastly, it is concluded that the epistemological problem posed by the phenomenon of organisational knowledge cannot be solved without a shift in ontology. In other words, appropriating the concept of tacit knowledge within an information processing ontology is not a viable strategy for knowledge management theory that is aimed at addressing the problem of knowledge creation.

Chapter Two

MICHAEL POLANYI: PERSONAL KNOWLEDGE AND TACIT KNOWLEDGE

I shall consider human knowledge by starting from the fact that we can know more than we can tell.

Michael Polanyi, "Tacit Dimension."

2.1 INTRODUCTION

This chapter considers Michael Polanyi's philosophical position and the specific explanatory function of the concept of tacit knowledge in his argument. Polanyi is mainly of interest because he coined the term "tacit knowing" and is repeatedly cited in organisation and management literature almost every time that this concept is used. To a reader interested in the concept of tacit knowledge it soon becomes clear that in management studies the concept has been adapted considerably from Polanyi's original conceptualisation. It was therefore not long before a number of articles criticised management studies' conception, and particularly Nonaka and Takeuchi's notion of a convertible tacit knowledge, following the observation that it is contrary to Polanyi's notion of tacit knowledge as the basic form of knowledge underlying all explicit knowledge.[28]

[28] Brohm. Bringing Polanyi onto the Theatre Stage; Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Maasdorp, CH. The Theme of Tacit Knowledge in Information and Knowledge Management, paper presented at the *Second Biennial*

This chapter is yet another overview of Polanyi's conceptualisation of tacit knowledge, but it differs from other similar articles in terms of the context and the level on which Polanyi's conceptualisation is considered. Firstly, this chapter places the concept of tacit knowledge in the wider context of Polanyi's philosophical argument. Although management writers latched onto the concept of tacit knowledge, Polanyi far more frequently uses the concept as a verb – *tacit knowing* – to emphasise the fact that it is an act of integration, rather than content. There will be a return to the difference between tacit knowledge and tacit knowing as it holds the key to understanding the explanatory function of tacit knowing/knowledge in his theory of personal knowledge.

However, for the moment it will suffice to say that in Polanyi's writings the act of tacit knowing leads firstly to the notion of personal knowledge and secondly to the notion of tacit knowledge. Personal knowledge can initially be defined as the commitment on the part of a scientist to his or her yet unknown, but approaching discovery. Strictly speaking, the concept of tacit knowledge relates to the complex whole of skills and presuppositions that a scientist employs. The notion of personal knowledge is a central part of Polanyi's critique of objectivism, while the concept of tacit knowledge is part of the terminology that explains the mechanics of personal knowledge. At first Polanyi preferred the term personal knowledge, because he considered the notion of commitment as the basis of knowledge. Later when he sought to anchor his argument in some sort of logical structure of knowing, he started to prefer the concept of tacit knowing to that of personal knowledge and commitment.

Writers who employ Polanyi's distinction between tacit and explicit usually refer only to the technical aspect of tacit knowing,[29] without including in their analysis his broader programme – that of a post-critical philosophy. This chapter will go beyond

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DISSAnet Conference, Pretoria, South Africa 2002; Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management; Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications; Tsoukas. Do We Really Understand Tacit Knowledge?

[29] Nonaka and Takeuchi. *The Knowledge-Creating Company;* Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications.

Polanyi's conceptualisation of tacit knowing/knowledge and consider the function of the concept in his broader philosophical argument. This does not mean that the analysis of Polanyi's argument will be exhaustive. Instead of offering a complete exposition of Polanyi's philosophical position, this chapter will consider it only to the extent necessary to highlight the particular function of the concept of tacit knowledge in his argument.

Secondly, this chapter does not assume that Polanyi's specific use of the concept of tacit knowledge carries a particular authority. Although there are notable differences between Polanyi's specific conception of tacit knowledge and the use of his ideas in organisation and management studies (especially knowledge management literature), it does not imply that Polanyi's interpretation is authoritative. Management writers might have misunderstood Polanyi or he might mean something completely different with tacit knowledge than they do, but the validity of a specific conception of tacit knowledge is not dependent on its origin. The fact that a concept originally meant something quite different does not necessarily have any direct bearing on the validity of later versions of it. At best, it indicates that in management theories the concept of tacit knowledge does not have the same function as in Polanyi's theory. For such an observation to count as criticism, specific independent reasons are needed why the adaptation of the concept of tacit knowledge by management writers were changes for the worse. By independent reasons is meant reasons that are independent from the observation that tacit knowledge is conceptualised differently in management studies than in Polanyi's theory.

If Polanyi's conceptualisation of tacit knowledge is not authoritative, the question is now why it is still worthwhile to consider his position. This framework does not consider Polanyi as the originator or father of the concept of tacit knowledge and goes beyond the technical aspects of Polanyi's conceptualisation to consider the explanatory function of the concept of tacit knowledge in the broader context of Polanyi's own theory as well. Unlike other arguments that note the discrepancy between the meaning of the concept in management studies and its meaning in the

theory where it originated, this framework considers Polanyi's theory alongside and on the same level as subsequent theories that incorporated the concept of tacit knowledge. Starting with Polanyi has the advantage of tracing subsequent interpretations of the concept of tacit knowledge in management studies chronologically. Furthermore, Polanyi's theory is more abstract than the theories in management studies, which creates the opportunity to work through the full complexities of the concept of tacit knowledge before tackling its role in a variety of subsequent management theories. This approach prepares a comprehensive starting point, based on an analysis of Polanyi's formulation of the concept, from which one can trace and compare the changes in explanatory function in the theories that adopted and adapted the concept.

2.2 APPROACHING POLANYI

The question of how to approach Polanyi's work on tacit knowledge remains problematic. His own treatment of the concept of tacit knowledge is often inconsistent. For example, he would sometimes use the terms tacit 'knowing' and tacit 'knowledge' interchangeably and at other times, they seem to be two different categories. Furthermore, later applications of Polanyi's concept seem to rely on his earlier texts, while writers criticising these applications seem to rely on a particular later text. This small section provides a brief overview of Polanyi's writings concerning tacit knowing/knowledge. The approach that will be taken when describing Polanyi's theory is also accounted for in this section. Inevitably, the overview in the following section will introduce some concepts that form part of Polanyi's terminology without explaining these terms fully. These concepts will however be explained in the rest of the chapter.

Science, Faith and Society[30] is the first work of Polanyi that applies the principles of Gestalt psychology to scientific knowledge. In his major work, *Personal Knowledge*,[31]

[30] Polanyi, M. 1946. *Science, Faith and Society*. London: Oxford University Press

[31] Polanyi. *Personal Knowledge*

Polanyi introduced the notion of the tacit dimension as part of a critique of objectivism in philosophy and science.[32] Following the publication of *Personal Knowledge*, Polanyi restated and refined his ideas around the tacit dimension in five articles and two further books. *Knowing and Being*[33] argues that tacit knowing is the act of perception that brings the knower into contact with reality. Polanyi would say that *Knowing and Being* explores the "ontological claims" of the notion of tacit knowing.[34] The following year *Tacit Knowing: Its bearing on some problems of philosophy*[35] touched on a number of philosophical problems – especially on what Polanyi calls the "phenomenal aspect" of tacit knowing. In describing the act of integrating particulars into a whole, *The Logic of Tacit Inference*[36] develops the "functional aspect" of tacit knowing. Another article titled *The Structure of Consciousness*[37] elaborates on the relationship between the two kinds of awareness that forms the basic structure of tacit knowing. This article also contains improved examples of tacit integration to correct certain misconceptions about the difference between tacit and explicit knowledge. In *The Tacit Dimension*[38], Polanyi integrated the different structural aspects of tacit knowing. In the first chapter, the logical structure of tacit knowing is unpacked: consisting of functional and phenomenal relations and semantic and ontological aspects. If the first chapter focused on epistemology, the second chapter of *The Tacit Dimension* is concerned with ontology and through the concept of "emergence" Polanyi seeks to link knowing and the known. Polanyi

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[32] Brohm. Bringing Polanyi onto the Theatre Stage. The fact that the notion of tacit knowledge figures as part of an argument against objectivism is not unrelated to the issue concerning management studies alleged misreading of Polanyi. Brohm observes that most management literature draws on objectivist assumptions and therefore most management models wherein tacit knowledge figures, experience some sort of epistemological inconsistency. Similarly, Stacey argues that most of knowledge management theory is still trapped in the subject/object split. See, Stacey. *Complex Responsive Processes in Organization*

[33] Polanyi, M. 1961. Knowing and Being, in Grene, M (ed.), *Knowing and Being: Essays by Michael Polanyi*: 123-37. London: Routledge

[34] Grene, M (ed.), 1969a. *Knowing and Being: Essays by Michael Polanyi*. London: Routledge: xv.

[35] Polanyi, M. 1962. Tacit Knowing: Its Bearing on Some Problems of Philosophy, in Grene, M (ed.), *Knowing and Being: Essays by Michael Polanyi*: 159-80. London: Routledge

[36] Polanyi, M. 1964. Logic of Tacit Inference, in Grene, M (ed.), *Knowing and Being: Essays by Michael Polanyi*: 139-57. London: Routledge

[37] Grene (ed.). *Knowing and Being*: 315-28; Polanyi, M. 1965. The Structure of Consciousness, in Grene, M (ed.), *Knowing and Being: Essays by Michael Polanyi*: 211-24. London: Routledge

[38] Polanyi, M. 1967. *The Tacit Dimension*. Garden City NY: Doubleday and Company

elaborated on the "semantic aspect" in *Sense-giving and Sense-reading*.[39] The last book in which tacit knowledge features is *Meaning*,[40] which was published with Harry Prosch. This book is essentially a collection of lectures that Polanyi delivered in three lecture series that extended the notion of personal knowledge to other realms of meaning.

Marjorie Grene, the editor of a collection of Polanyi's papers, considers the statement of the theory of tacit knowledge in the first chapter of *The Tacit Dimension* the most comprehensive and the clearest.[41] Most discussions of the concept of tacit knowledge rely substantially (or almost exclusively) on the argument as it appears in *The Tacit Dimension*.[42] Instead of starting with the larger theory as found in *Personal Knowledge*, the logic of explanation might be best served if the argument in *The Tacit Dimension* is used as an entry point to grasping what Polanyi meant by tacit knowing/knowledge. As the argument covers the structure of tacit knowing and the sub-themes of the functional, phenomenal, semantic and the ontological aspects of tacit knowledge are encountered, the rest of Polanyi's articles will be weaved into the explanation. This will conclude the technical treatment of the concept of tacit knowledge. At this point we are only concerned with Polanyi's epistemology, not with his ontology. Thereafter the function of tacit knowledge in terms of Polanyi's larger argument against objectivism in science will be considered. After that the elements relevant to management studies can be distilled and implications can be drawn. The chapter will close with speculations on possible theoretical enlargements of Polanyi's theory of tacit knowing.

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[39] Polanyi, M. 1967. Sense-Giving and Sense-Reading, in Grene, M (ed.), *Knowing and Being: Essays by Michael Polanyi*: 181-207. London: Routledge

[40] Polanyi, M and H Prosch. 1975. *Meaning*. Chicago IL: University of Chicago Press

[41] Grene (ed.). *Knowing and Being*: xiv.

[42] Interestingly, *Personal Knowledge* is cited as least as much as *The Tacit Dimension.* A quick search of the social science citation index revealed that Personal Knowledge (1958) has been cited 1052 times, while The Tacit Dimension (1966 and the 1967 paperback edition) had been cited 1019 times. One can assume that often times the two works are cited together, but the broader argument of Personal Knowledge is conspicuously absent from most management studies expositions of Polanyi.

2.3 POLANYI'S STARTING POINT

Polanyi argues that there is a common structure underlying all kinds of knowledge.[43] From this assertion follows that the usual practical/theoretical dichotomy is not applicable when it comes to epistemology. His argument in *Personal Knowledge* is to show that scientific knowledge is ultimately also grounded in personal commitment.[44] In the articles and books following the publication of *Personal Knowledge*, Polanyi develops a terminology to accurately describe the logical structure that underlies all our knowledge. Through refining the terminology and the examples he uses to explain the terminology, Polanyi's argument regarding tacit knowing is strengthened. The emphasis of the argument moves from personal commitment as an aspect of all knowledge towards a logical structure underlying all forms of knowledge.

This focus on the logical structure of all knowledge is also the reason why Polanyi prefers to speak of knowing rather than of knowledge. He states that, "I shall always speak of *knowing*...to cover both practical and theoretical knowledge."[45] This might partially solve the tacit knowledge/knowing dilemma, when reading Polanyi, but even so he is still not consistent and often refers to "tacit knowledge" as well[46] - once even in the title of an article, "Tacit knowledge and its bearing on some problems of philosophy."[47] It has to be assumed that Polanyi does not consider knowledge as a content separate from awareness, which is integrated by the structure of knowing. By contrast, in management studies, the emphasis is always on tacit knowledge and as will become clear in subsequent chapters, it is not understood as a common *structure*

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43 Polanyi. Tacit Knowing: Its Bearing on Some Problems of Philosophy: 144; Polanyi. Sense-Giving and Sense-Reading: 181; Polanyi and Prosch. *Meaning*: 33-45.

44 Polanyi. *Personal Knowledge*: 59,300,02-3,24.

45 Polanyi. *The Tacit Dimension*: 7.

46 References to tacit knowledge include, Polanyi. Knowing and Being: 133; Polanyi. Logic of Tacit Inference: 144; Polanyi. Sense-Giving and Sense-Reading: 181,87,95,97; Polanyi and Prosch. *Meaning*: 34,43,46-48,149,45.; Whilst references to tacit knowing include, Polanyi. Knowing and Being: 138; Polanyi. Tacit Knowing: Its Bearing on Some Problems of Philosophy: 161,67,71; Polanyi. Logic of Tacit Inference: 140,51; Polanyi. The Structure of Consciousness: 212,18; Polanyi. Sense-Giving and Sense-Reading: 182,83,94,95,99,204; Polanyi and Prosch. *Meaning*: 33,41,42,33-34,37.

47 Polanyi. Tacit Knowing: Its Bearing on Some Problems of Philosophy.

of knowing, but rather as a *content* of knowing that is difficult to communicate as information.[48] Even though Polanyi is referenced in these cases, it is an obvious misreading.

There are three themes to Polanyi's notion of tacit knowing. He calls them the functional-, phenomenal- and semantic aspects of tacit knowing.[49] Under the "functional aspect of tacit knowing," Polanyi extends insights from Gestalt perception to argue that the integration of particulars into wholes is the common structure of all knowledge, whether practical or theoretical.[50] Under the "phenomenological aspect of tacit knowing," he uses the basic model from Gestalt

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48 Ambrosini, V and C Bowman. 2001. Tacit Knowledge: Some Suggestions for Operationalisation, *Journal of Management Studies* 38; Athanassiou, N and D Nigh. 1999. The Impact of Us Company Internationalization on Top Management Team Advice Networks: A Tacit Knowledge Perspective, *Strategic Management Journal* 20; Baumard, P. 1999. *Tacit Knowledge in Organizations*. London: Sage; Bennett, RH. 1998. The Importance of Tacit Knowledge in Strategic Deliberations and Decisions, *Management Decision* 36/ 9; Choo, CW. 1998. *The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions*. Oxford: Oxford University Press; Choo, CW. 2000. Working with Knowledge: How Information Professionals Help Organizations Manage What They Know, *Library Management* 21/ 8; Eraut, M. 2000. Non-Formal Learning and Tacit Knowledge in Professional Work, *British Journal of Educational Psychology* 70; Hackley, CE. 1999. Tacit Knowledge and the Epistemology of Expertise in Strategic Marketing Management, *European Journal of Marketing* 33/ 7/8; Haldin-Herrgard, T. 2000. Difficulties in Diffusion of Tacit Knowledge in Organizations, *Journal of Intellectual Capital* 1/ 4; Hannabuss, S. 2000. Narrative Knowledge: Eliciting Organisational Knowledge from Storytelling, *Aslib Proceedings* 52/ 10; Herschel, RT, H Nemati, and D Steiger. 2001. Tacit to Explicit Knowledge Conversion: Knowledge Exchange Protocols, *Journal of Knowledge Management* 5/ 1; Jankowicz, D. 2001. Why Does Subjectivity Make Us Nervous? Making the Tacit Explicit, *Journal of Intellectual Capital* 2/ 1; Johannessen, J-A, J Olaisen, and B Olsen. 2001. Mismanagement of Tacit Knowledge: The Importance of Tacit Knowledge, the Danger of Information Technology, and What to Do About It, *International Journal of Information Management* 21/ 1; Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Linde, C. 2001. Narrative and Social Tacit Knowledge, *Journal of Knowledge Management* 5/ 2; Lubit, R. 2001. Tacit Knowledge and Knowledge Management: The Keys to Sustainable Competitive Advantage, *Organizational Dynamics* 29/ 4; Lueg, C. 2001. Information, Knowledge, and Networked Minds, *Journal of Knowledge Management* 5/ 2; O'Brien, RC. 1995. Employee Involvement in Performance Improvement: A Consideration of Tacit Knowledge, Commitment and Trust, *Employee Relations* 17/ 3; Saint-Onge, H. 1996. Tacit Knowledge: The Key to the Strategic Alignment of Intellectual Capital, *Strategy and Leadership* 24/ 2; Schamer, CO. 2001. Self-Transcending Knowledge: Sensing and Organizing around Emerging Opportunities, *Journal of Knowledge Management* 5/ 1; Schariq, SZ. 1999. How Does Knowledge Transform as It Is Transferred? Speculations on the Possibility of a Cognitive Theory of Knowledge Landscapes, *Journal of Knowledge Management* 3/ 4; Smith, EA. 2001. The Role of Tacit and Explicit Knowledge in the Workplace, *Journal of Knowledge Management* 5/ 4; Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications.

49 Polanyi. Logic of Tacit Inference: 141; Polanyi. The Structure of Consciousness: 212,18.

50 Polanyi. Logic of Tacit Inference: 141; Polanyi. The Structure of Consciousness: 212,18.

and applies it to skills, tactile perception (the use of tools and probes) and even the use of sensory organs.[51] The last theme, concerning the "semantic aspect," relates to the implications this general structure of knowledge has for the way in which meaning is constructed or derived.[52] The following sections use these themes to explain the logical structure of tacit knowing as Polanyi presented it.

2.4 PERCEPTION – THE FUNCTIONAL ASPECT OF TACIT KNOWING

The common structure underlying all knowledge consists of the integration of particulars into a whole that becomes the meaning of the integrated particulars. Polanyi looked towards Gestalt perception as a model to describe the integration of the parts into a whole. Using the recognition of faces as an example, Polanyi shows that we can integrate the many particulars that make up a person's face into a whole (in this case a physiognomy) that enables us to recognise the whole face amongst many others.[53] Still when asked we are often unable to identify the parts that make up the whole. "Gestalt psychology has demonstrated that we may know a physiognomy by integrating our awareness of its particulars without being able to identify these particulars."[54]

In the case of recognising a physiognomy, like the recognition facial expressions, the particulars themselves are not clearly definable. Polanyi calls this the "unspecifiability" of particulars.[55] Unspecifiability is not limited to cases where the particulars themselves are not clearly definable. Consider that a "comprehensive entity" is made up of particulars that are perceptually integrated into a whole. Efforts to define such a comprehensive entity will firstly aim at identifying its particulars

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51 Polanyi. Logic of Tacit Inference: 141; Polanyi. The Structure of Consciousness: 212,18.

52 Polanyi. Logic of Tacit Inference: 145; Polanyi. The Structure of Consciousness: 212,18; Polanyi. Sense-Giving and Sense-Reading: 182.

53 Polanyi. *The Tacit Dimension*: 4-5.

54 Polanyi. *The Tacit Dimension*: 6.

55 Polanyi. Knowing and Being: 124-27; Polanyi. *The Tacit Dimension*: 6.

and secondly attempt to describe the relation between those particulars.[56] Sometimes the set of particulars and the relation between the particulars are observed separately.

In the case of topographical features recognisable from the air that are unrecognisable from the ground, the particulars themselves are clearly visible, but the relation between them is only observable from the air. Polanyi uses the example of prehistoric settlement sites that were discovered from the air.[57] Unlike in the case of recognising faces, the particulars themselves are clearly visible in this case. It can be said that in the case of recognising physiognomies (faces or facial expressions), some particulars are not clearly definable. One might be able to point out a large nose or bushy eyebrows, but there will always be a residue of unspecified particulars when it comes to the recognition of faces. In the case of the discovery of prehistoric settlement sites from the air the particulars are clearly definable, but seen in isolation they appear different.[58] A related example from Gestalt psychology is the case of a colour appearing differently depending on the background against which one views it.

Consider now a case where the particulars are clearly definable and where they do not appear in isolation, yet describing the relation between particulars remains problematic. Polanyi uses the examples of anatomy, geological topography and the relations between parts of a complex machine.[59] In the case of anatomy, one can often identify the several organs, but their "mutual relation inside the body can be grasped only by a sustained effort of the imagination, based on the partial aspects revealed by successive stages of dissection."[60]

Instances of unspecifiability built into the structure of the perception of comprehensive entities are therefore either a case of the particulars themselves being unclear, or a case of the relations between particulars being unclear. These cases of unspecifiability do not disprove the claims Polanyi makes about the structure of perception, but instead leads him to argue that the basic form of integration is tacit.

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56 Polanyi. Knowing and Being: 123.

57 Polanyi. Knowing and Being: 123.

58 Polanyi. Knowing and Being: 124.

59 Polanyi. Knowing and Being: 124.

60 Polanyi. Knowing and Being: 124.

Proximal and Distal Terms of Tacit Knowing

According to Polanyi the basic structure of tacit knowing "always involves two things, or two kinds of things. We may call them the two terms of tacit knowing."[61] These two terms are the subsidiary particulars, forming the first or proximal term of tacit knowing, and the meaning that these particulars jointly form when tacitly integrated, which presents the second or distal term of tacit knowing. "We may call the first term *proximal*, and the second, *distal*. It is the proximal term, then, of which we have a knowledge that we may not be able to tell."[62] Polanyi referred to psychological experiments concerning a phenomenon called "subception" in which volunteers were subjected to electric shock accompanying a verbal or visual sign. With the current later switched off, the subjects still correctly anticipated the electric shock when presented with the signs usually accompanying the shock. Curiously, the subjects were unable to identify the signs explicitly or to give reasons for their anticipation.[63] Polanyi took experiments in subception as empirical proof of the basic structure of knowing as he proposed it. In his terminology, the electric shock represented the second or distal term of tacit knowing and the sign accompanying the shock the first or proximal term of tacit knowing. "Such is the *functional relation* between the two terms of tacit knowing: *we know the first term only by relying on our awareness of it for attending to the second.*"[64]

> We may say...that we are aware of the proximal term of an act of tacit knowing in the appearance of its distal term; we are aware of that *from* which we are attending *to* another thing, in the *appearance* of that thing. We may call this the *phenomenal structure* of tacit knowing.[65]

The *proximal term* of tacit knowing is the clues or parts that are subsidiarily known and that which is focally known is the *distal term* of tacit knowing. The proximal and

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61 Polanyi. *The Tacit Dimension*: 9.

62 Polanyi. *The Tacit Dimension*: 10.

63 Polanyi. *The Tacit Dimension*: 7-8.

64 Polanyi. *The Tacit Dimension*: 10.

65 Polanyi. *The Tacit Dimension*: 11.

the distal terms are joined together by tacit knowing. It is not merely a case of seeing the parts in their joint appearance – "the proximal term consist of things seen in isolation, and the distal term consist of the same things seen as a coherent entity."[66] Tacit knowing integrates the subsidiary particulars into the focal whole (or the proximal into the distal). "We may say then that in tacit knowing we always attend *from* the proximal *to* the distal term."[67]

Polanyi goes beyond Gestalt psychology's application of this insight about the way we integrate things when we perceive as the basic model for his epistemology.

> Gestalt psychology has assumed that perception...takes place through the spontaneous equilibration of its particulars...However; I am looking at Gestalt...as the outcome of an active shaping of experience performed in the pursuit of knowledge. This shaping or integrating I hold to be the great and indispensable tacit power by which all knowledge is discovered, and once discovered, is held to be true.[68]

In the subsequent sections it will be shown how Polanyi applies the example of the integration of particulars into a whole when perceiving an entity to all the other domains of knowledge. The first step is to show the similarities between the structure of perception and the structure of skills. Polanyi will argue that the individual muscular acts that make up a skill are the particulars being integrated into skilful performance.

2.5 ACTION – THE PHENOMENOLOGICAL ASPECT OF TACIT KNOWING

The second strand in Polanyi's argument concerns the "structural kinship" between the acts of knowing and doing. In fact, in *Personal Knowledge*, Polanyi starts the

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[66] Polanyi. Logic of Tacit Inference: 140.

[67] Polanyi. Logic of Tacit Inference: 141.

[68] Polanyi. *The Tacit Dimension*: 6.

argument with an analysis of skills.[69] In the same way that we combine unspecifiable particulars into a recognisable whole when recognising comprehensive entities, a "skill combines elementary muscular acts which are not identifiable, according to relations we cannot define."[70] Polanyi says that although "we may prefer to speak of *understanding* a comprehensive entity and of *mastering* a skill. We do use the two words nearly as synonyms. Actually we speak equally of *grasping* a subject or an art."[71]

Returning to the two stages in the recognition of a comprehensive entity, one effort "proceeds from a recognition of a whole towards an identification of its particulars;"[72] the other effort proceeds from "the recognition of a group of presumed particulars towards the grasping of their relation in the whole."[73] These two efforts correspond with the difference between analysis and integration. According to Polanyi, analysis of a comprehensive entity involves "concentrating our attention on the particulars"[74] and this temporarily weakens our sense of its coherent existence. Integration involves a shift of our awareness towards the whole and then "the particulars tend to become submerged in the whole."[75]

Polanyi is of the opinion that "[t]here is a close analogy between the elucidation of a comprehensive entity and the mastering of a skill."[76] Just as one's understanding of a comprehensive entity can be deepened through alternate analysis and re-integration, it often helps the mastery of a skill to break it down into its constituent motions and to practice them in isolation, before attempting to integrate them into one flowing sequence.[77] Take for example piano students practicing first the melody with the right hand and then the harmony with the left before attempting integration. Another

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69 Polanyi. *Personal Knowledge*: chapter 4.

70 Polanyi. *The Tacit Dimension*: 8.

71 Polanyi. Knowing and Being: 126.

72 Polanyi. Knowing and Being: 125.

73 Polanyi. Knowing and Being: 125.

74 Polanyi. Knowing and Being: 125.

75 Polanyi. Knowing and Being: 125.

76 Polanyi. Knowing and Being: 125.

77 Polanyi. Knowing and Being: 126.

example is that of athletes practicing sections of movements that make up a complex stroke repeatedly to improve overall performance.

Just as in the case of recognising comprehensive entities, there are limits to the specifiability of skills. The constituent motions of a skill do not comprise the entire skill. "Experience shows that no skill can be acquired by learning its constituent motions separately."[78] Polanyi uses the example of the touch of a pianist to illustrate the limits on specifiability in the case of skilful performance. It is only after mastering a skill that analysis can improve performance, because isolation of the particulars (in this case the constituent motions) seem to alter these particulars. The pianist concentrating on his fingers, instead of on the music, find that the "identification of the constituent motions of a skill tends to paralyse performance."[79]

> Here again the particulars of a skill appear to be unspecifiable, but this time not in the sense of being ignorant of them. For in this case we can ascertain the details of our performance quite well, and its unspecifiability consists in the fact that the performance is paralysed if we focus our attention on these details. We may describe such a performance as logically unspecifiable, for we can show that in a sense the specification of the particulars would logically contradict what is implied in the performance or the context in question.[80]

Polanyi's other frequent example of this paralysis is that of swimmers sinking when they think of exactly how they swim.[81] Polanyi also cites the example of Blondin the tightrope walker who stressed the importance of concentrating on getting off on the other end of the rope, rather than on walking the rope itself.[82] However skilful

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78 Polanyi. Knowing and Being: 126.

79 Polanyi. Knowing and Being: 126.

80 Polanyi. *Personal Knowledge*: 56.

81 Polanyi. *Personal Knowledge*: 49-50,56; Polanyi and Prosch. *Meaning*: 40.

82 Polanyi and Prosch. *Meaning*: 36.

performance can easily be restored through "turning our attention away from the particulars and towards their joint purpose."[83]

As in the case of integrating particulars into a whole when recognising comprehensive entities, the act of integrating constituent motions into skilful performance is itself unspecifiable. Imitating a skilful performer may offer guidance, but the "feel" of skilful performance is something that one has to discover for oneself.[84] The unspecifiable act of integration, Polanyi calls tacit integration.[85]

2.5.1 TWO KINDS OF MEANING

Thus far the common structure of knowledge holds for cases where the isolated particulars and what they jointly mean are not clearly separated in space; as in the case of recognising comprehensive entities, such as faces or facial expressions, or topographical anatomies or geographies, or even complex machinery and so forth. The same common structure also holds for skills and their constituent motions. Polanyi terms these "physiognostic" examples and distinquishes them from examples of "telegnostic" meaning, where the uncomprehended particulars are spatially removed from the whole that signifies their meaning.[86] The challenge is to extend the application of the common integrative structure of knowledge to telegnostic meanings as well. Returning to the case of visual perception, Polanyi argues, "a major part of the particulars shaping the sight of an external object are *internal* actions and stimuli."[87] Obviously, we can control our eye muscles and direct our eyes, but as internal particulars shaping perception of the whole, the movement of our eye muscles or the contraction of the iris is not clearly observable in itself. In other words, the internal actions and stimuli of our sensory organs are also unspecifiable particulars of perception. This unspecifiability of the particulars of perception is different from the unspecifiability of the physiognostic examples in the

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83 Polanyi. Knowing and Being: 126.

84 Polanyi. Knowing and Being: 126.

85 Polanyi and Prosch. *Meaning*: 39,40-41,42,62.

86 Polanyi. Knowing and Being: 128.

87 Polanyi. Knowing and Being: 127.

sense that the uncomprehended particulars are inside our own body and what they jointly mean (what we see and hear) is projected into a space outside of the body.[88]

Extending the common structure from physiognostic to telegnostic integrated meanings, makes it possible for Polanyi to extend Gestalt's insights about visual perception to tactile perception and to use tactile perception as a bridge to performance. It becomes clear that the use of tools and probes also display the structure of telegnostic integrated meanings.

> The actual impact of the tool on our palm and fingers is unspecifiable in the same sense in which the muscular acts composing skilful performance are unspecifiable; we are aware of them in terms of the tool's action on its object, that is, in the comprehensive entity into which we integrate them.[89]

Polanyi employs a number of examples to illustrate this point. A person using a hammer to drive nails, actually feels the hammer driving the nail. Someone wielding a hammer is aware of the hammer and the nail. The focus of attention would be on the nail and the effects of the hammer on it. One tries to drive the nail as straight and effectively as possible. At the same time, one is aware of the feeling of the hammer in one's palm, but the attention of the hammer is secondary to what happens to the focus of one's attention – the nail. "I know the feelings in the palm of my hand by relying on them for attending to the hammer hitting the nail. I may say that I have a subsidiary awareness of the feelings in my hand which is merged into my focal awareness of my driving the nail."[90] In a similar way, a rower pulling on an oar feels the resistance of the water, rather than the shaft of the oar, or when using a paper-knife we feel the blade cutting the pages, rather than the pressures of the handle on the palm of the hand.[91]

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88 Polanyi. Knowing and Being: 127,29.

89 Polanyi. Knowing and Being: 127.

90 Polanyi and Prosch. *Meaning*: 33.

91 Polanyi. Knowing and Being: 127.

Polanyi's other example is that of a blind person exploring a cavity with a probe. The person is only tacitly aware of the changing pressures that can be felt on the palm as the tip of the probe hits the edges of the cavity. The focus of the attention remains on the cavity itself. The sensations felt in the palm only get their meaning in terms of the contact between the tip of the probe and the edges of the cavity. The blind person projects the sensations in his/her palm towards the end of the probe and the cavity.[92] There is of course a difference between a blind person using a cane or probe for walking and someone that has never before used a stick to help them to walk. Someone skilled with a walking stick is much more successful in focussing on the tip of the probe, rather than on the feelings in the palm. In Polanyi's language, one can say that the skilful use of tools (like probes) depends on ones ability to interiorise the subsidiary elements (such as the sensations in the palm) to such an extent that clear focus on the activity (such as the edges of the cavity) becomes possible.

2.5.2 INDWELLING AS THE INTERIORISATION OF PARTICULARS

The term Polanyi uses to describe an advanced ability of interiorisation of particulars is *indwelling*.[93] The paradigm of indwelling extends the insight about the telegnostic nature of sensory perception to the use of tools. Just as one dwells inside one's body in order to perceive the world outside, the skilful user dwells in his/her tools. The paradigm of indwelling can be extended to cover all of what we do.

> We may say that when we learn to use a language, or a probe, or a tool, and thus make ourselves aware of these things as we are of our body, we *interiorize* these things and make *ourselves dwell in them*.[94]

From the point of view of logical structure, Polanyi does not make a distinction between how we use our sensory organs, or physical tools, but the important insight is that he also does not distinguish between physical tools and intangible tools such as conceptual frameworks, theories, or even cultural knowledge. All these things

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92 Polanyi. *The Tacit Dimension*: 12.

93 Polanyi. *The Tacit Dimension*: 16.

94 Polanyi. Logic of Tacit Inference: 148.

share the same basic logical structure of tacit integration. New theoretical knowledge for example needs to be assimilated (or understood) before a student can apply it properly (by dwelling in the theory). In the case of a theory the clues from which the theory derives subsidiarily contribute to the overall theory, which in turn gives meaning to the clues. Polanyi can therefore extend this basic structure to include new scientific knowledge:

> We may say that scientific discovery reduces our focal awareness of observations into a subsidiary awareness of them, by shifting our attention from them to their theoretical coherence.[95]

2.6 MEANING – THE SEMANTIC ASPECT OF TACIT KNOWING

2.6.1 TWO KINDS OF AWARENESS AND DIRECTEDNESS (INTENTIONALITY)

It was argued that both physiognostic and telegnostic meanings consist of the integration of a set of particulars into a whole that becomes the meaning of the particulars. The question is now what exactly is the relation between a set of particulars and the comprehensive entity into which it is integrated. Polanyi shows that we can notice particulars in two different ways. We can sometimes observe the particulars in themselves, by focussing on the isolated particulars. In this case, we notice them uncomprehendingly, because we are *focally* aware of them. We can also notice the entity to which they contribute, usually by directing our attention beyond the particulars to their participation in the whole. In this case, we notice the particulars understandingly as part of the whole, and we are only *subsidiarily* aware of the particulars themselves.

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[95] Polanyi. Logic of Tacit Inference: 140.

> "These two kinds of awareness – the subsidiary and the focal – are fundamental to the tacit apprehension of coherence.... [Gestalt] has shown that within a whole its parts have a functional appearance which they lack in isolation and that we can cause the merging of the parts in the whole by shifting our attention from the parts to the whole."[96]

Polanyi makes it clear that the subsidiary and the focal are not two degrees of attention. He cites the case of the diagnosis of an illness – "when, after having first looked uncomprehendingly at the symptoms of a patient, we hit on the diagnosis of his illness, his symptoms become meaningful without becoming less noticeable."[97] It is in fact two wholly different kinds of attention given to the same particulars. The difference is semantic, because when we are focally aware of the particulars they are relatively meaningless, while when noticed subsidiarily in terms of the comprehensive entity to which they contribute, the particulars gain in meaning.[98]

Tacit knowing concerns the integration of two types of awareness, rather than the conscious accessibility of the clues that make up the entity perceived. Whether the clues are marginal or subliminal or clearly visible does not alter the structure of tacit knowing.

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[96] Polanyi. Logic of Tacit Inference: 140.

[97] Polanyi. Knowing and Being: 128.

[98] Polanyi. Knowing and Being: 128.

> The appearance of a thing at the centre of my attention depends on clues to which I am not directly attending. These clues are of two kinds. There are some that we cannot experience in themselves. The contraction of my eye muscles or the stirring of my labyrinth organ I cannot observe directly. These clues are *subliminal*. Other clues...[that] I normally see ... from the corner of my eye, and I could observe them directly, if I wanted to. We may call such clues *marginal*. To neither kind of clues do I attend directly, yet both kinds contribute to the apparent reality of the object on which my attention is focused. *We may say that my awareness of both kind of clues is subsidiary to my focal awareness of that object*.[99]

The case of the diagnosis of a disease whose symptoms are clearly visible for all to see, illustrates that even when the clues are clearly visible, the structure of knowing remains the same. As a result it follows that equating tacit knowledge with unconscious or preconscious knowledge[100] is a misconception.

> I have said already in Personal Knowledge and have continued to emphasize since then, that it is a mistake to identify subsidiary awareness with unconscious or preconscious awareness, or with the Jamesian fringe of awareness. What makes an awareness subsidiary is the function that it fulfills; it can have any degree of consciousness, so long as it functions as a clue to the object of our focal attention.[101]

Polanyi tried to dispel this misconception by introducing the example of perception of a three-dimensional picture through the use of stereoscopic photographs.[102] The particulars are clear and consciously available in the form of the two stereoscopic

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[99] Polanyi. Logic of Tacit Inference: 140.

[100] As Reber is wont to do when referring to implicit learning as the "cognitive unconscious". See Reber. Implicit Learning and Tacit Knowledge; Reber. *Implicit Learning and Tacit Knowledge: An Essay on the Cognitive Unconscious*

[101] Polanyi. *The Tacit Dimension*: 95-96.

[102] Polanyi. Tacit Knowing: Its Bearing on Some Problems of Philosophy: 167; Polanyi. Logic of Tacit Inference: 144; Polanyi. The Structure of Consciousness: 211,12; Polanyi. Sense-Giving and Sense-Reading: 184,89,91,93; Polanyi and Prosch. *Meaning*: 34,62.

photographs, but integration into the three-dimensional whole is made possible only by dwelling in the stereoscopic glasses.[103]

2.6.2 MEANING AS THE DIRECTION OF THE VECTOR OF INTEGRATION.

> "[I]n an act of tacit knowing we *attend from* something for attending *to* something else; namely, *from* the first term *to* the second term of the tacit relation."[104]

Polanyi calls the structure of tacit knowing "from-to knowing". This gives tacit knowing it's "vectoral quality"[105] or directedness. Tacit knowing is directed from the particulars to the whole and this directedness makes possible the tacit inference that gives the particulars their meaning.

> We have seen that by attending from the proximal to the distal, we cause a transformation in the appearance of both: they acquire an integrated appearance....the parts of the whole merge their isolated appearance into the appearance of the whole. This is the phenomenal accompaniment of tacit knowing, which tells us that we have a real coherent entity before us.[106]

Looking back, the functional aspect is the *from-to* relation of subsidiary particulars to a focal whole. We only know the particulars in the sense that we rely on our awareness of them in our attending to something else. The interplay between our focal and background awareness has the character of vectoral inference – moving from the subsidiary particulars to the focal target. The phenomenal aspect involves the transformation of the subsidiary awareness into a new sensory perception by integrating all the subsidiaries into a whole. The process of integration actually

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[103] Elsewhere Polanyi uses the example of stereoscopic pictures to argue that slightly conflicting clues are tacitly integrated. See, Grene (ed.). *Knowing and Being*: 167-68.

[104] Polanyi. *The Tacit Dimension*: 10.

[105] Polanyi. Logic of Tacit Inference: 141.

[106] Polanyi. Logic of Tacit Inference: 141.

establishes a coherent appearance. The semantic aspect refers to the production of meaning by the functional relation between the parts and the whole. Thus the integrated whole is the (joint) meaning of the subsidiaries.

This integration of the subsidiary particulars into the whole is the result of an *act* of the knower. No such integration is possible without a knower to link the two forms of awareness. The presence of a person in all knowledge is a logical necessity, because knowledge has a structure that relies on two kinds of awareness that can only be present in a person. In this sense Polanyi fuses knowledge and knowing. No knowledge can exist separately from an integrating act. Therefore all knowledge is personal and all knowing is action.

2.6.3 IMPLICATIONS OF TACIT KNOWING AS THE STRUCTURE OF KNOWING

Tacit integration is irreversible.

While it is possible to reverse explicit integration, it is impossible with tacit integration. Retracing the steps of explicit integration might be difficult, but it is always possible. Take for example the analysis of a logical puzzle or a mathematical problem. It is possible to move from the answer towards the constituent elements making up the answer and back again. In the case of a mathematical proof, one can move from the premises to the conclusion and from the conclusion to the premises. It is because the set of premises and the conclusion are linked logically to one another and each of these links can be analysed separately. However tacit integration is not retraceable in this way. Consider the examples of skilful performance again; once a skill is mastered one can never be ignorant of it again. This is true of riding a bicycle, as it is true of playing the piano. Using Polanyi's language, it is possible to shift ones attention from the focus of one's activity to the subsidiary elements and in this way cause the paralysis of an otherwise skilful performance - hence Polanyi's examples of pianists faltering and swimmers sinking.[107] But this paralysis is only temporary and the skilful activity can be restored by shifting the focus back to the object of the performance. While subsidiary elements can be brought into focus, this change of

[107] Polanyi. *Personal Knowledge*: 49-50,56.

focus also changes the nature of the activity. Logically this is implied in Polanyi's argument, since all focal attention is grounded in subsidiary awareness. It therefore follows that shifting one's focus from the comprehensive entity or the focal activity to the underlying particulars can only take place against the backdrop of another set of subsidiary elements. This brings us to the next point.

Tacit integration is the basic form of integration

Polanyi's conclusion is that logically all knowledge is grounded in some form of tacit knowing. There is no such thing as a wholly explicit knowledge. The notion of a wholly explicit knowledge, even in the case of mathematical theorems, is therefore absurd. Not only is there not a sharp division between tacit and explicit knowledge, representing the difference as on a continuum or a spectrum with a tacit and an explicit pole[108] is also a misrepresentation, because tacit knowing underlies other forms of knowing, providing a background for that which happens to emerge as the focus of awareness. It also follows that rather than a transformation of tacit knowledge into explicit[109], it would be more correct to speak of a shift in awareness which produces a new focal point (explicit), turning previously explicit knowledge into a supporting tacit background.

It is already clear that just following Polanyi's basic argument regarding the logical structure of knowledge, shows up a number of differences in interpretation between Polanyi and theorists that claim to use his epistemology. In the next two chapters on

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[108] Leonard and Sensiper came up with an interpretation based on the notion of a knowledge spectrum ranging from tacit to explicit. See, Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation.

[109] See Ambrosini and Bowman. Tacit Knowledge: Some Suggestions for Operationalisation; Baumard. *Tacit Knowledge in Organizations;* Choo. *The Knowing Organization;* Haldin-Herrgard. Difficulties in Diffusion of Tacit Knowledge in Organizations; Herschel, Nemati, and Steiger. Tacit to Explicit Knowledge Conversion: Knowledge Exchange Protocols; Jankowicz. Why Does Subjectivity Make Us Nervous? Making the Tacit Explicit; Kim, DH. 1993. The Link between Individual and Organisational Learning, *Sloan Management Review*/ Fall edition; Nonaka and Takeuchi. *The Knowledge-Creating Company;* Nonaka, I and G Von Krogh. 2000. *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford: Oxford University Press; Schariq. How Does Knowledge Transform as It Is Transferred? Speculations on the Possibility of a Cognitive Theory of Knowledge Landscapes; Smith. The Role of Tacit and Explicit Knowledge in the Workplace; Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications.

Ikujiro Nonaka[110] and the knowledge management theorists influenced by his views,[111] these differences will be outlined in more detail. In preparation for such a comparison it is necessary to also consider the wider philosophical implications of Polanyi's claims about the basic structure of knowledge. These implications centre on the relationship between knowledge, language and the paradigm of indwelling.

2.7 KNOWLEDGE, LANGUAGE AND THE PARADIGM OF INDWELLING

Later, when the reception of the concept of tacit knowledge in knowledge management theory is reviewed, it will be argued that the mainstream knowledge management theories assume a commonsense view of language as a simple symbolic representation of knowledge.[112] Stating it bluntly (since this point will be argued fully later) – much of knowledge management theory assumes that knowledge is somehow situated in the head of an individual and that some of that knowledge can then be articulated by means of language and thus transferred between individuals. This is implied in their emphasis on the explication (articulation) of the content of some knowledge in an individuals head, freezing that knowledge content in symbols so to speak, to then enable the transfer of that content from one individual to others. Such a model implies a number of assumptions regarding the difference between knowledge and information, language and the knowledge of language, as well as the basic model of communication between minds. These assumptions will be discussed chapters three and four, but the concern lies with Polanyi for the moment. It is impossible to graft the knowledge-transfer framework onto Polanyi's notion of tacit integration and the paradigm of indwelling. In terms of Polanyi, knowledge is not so

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[110] Nonaka and Takeuchi. *The Knowledge-Creating Company;* Nonaka and Von Krogh. *Enabling Knowledge Creation*

[111] Ambrosini and Bowman. Tacit Knowledge: Some Suggestions for Operationalisation; Baumard. *Tacit Knowledge in Organizations;* Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications.

[112] This assessment is made and argued fully by Ralph Stacey. See Stacey. *Complex Responsive Processes in Organization*: 13-39.

much the content of knowing, as it is the result of integrating awareness. The structure of tacit knowing (the *from-to* relation between focal and background awareness) shapes this content, which cannot exist independently from that which integrates it. Thus it makes little sense to distinguish between knowledge (as independent content) and knowing (as an act). In Polanyi's mind there is no such separation, since meaning is produced by the act of integrating the background particulars into the focal whole. Therefore straightforward point to grasp is that viewing the articulation of knowledge content as the explication of tacit knowledge, is clearly incompatible with the notion of tacit integration as the logical structure underlying all forms of knowing.

An attempt to build a philosophy of language on the structure of tacit integration would deal with the problem of the sign by denying any intrinsic associative link between the signifier and the signified. This is of course nowhere near noteworthy in post-Saussurian language philosophy, but it will help to illustrate the scope of the logical structure of tacit integration as put forward by Polanyi. Take the simple example of using a word (signifier) to designate an object (signified). Polanyi would agree with non-essentialist language philosophers that the "word and its object are not equal partners in an association."[113] In other words, the meaning of a word is not its association with the object that it names. "The word in use has in fact no interest in itself, as an object; in this it is very different from the object it names, which is interesting in itself as an object."[114] Most language philosophers that similarly divorces the meaning of the signifier from the signified, then solves the problem of meaning by referring to the relation between the signifiers in a system of language, often combining it with the practice of applying signifiers to that which is signified. Polanyi makes a similar move:

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[113] Polanyi and Prosch. *Meaning*: 69.

[114] Polanyi and Prosch. *Meaning*: 69.

> Our knowledge of the things denoted by words will have been largely acquired by experience, in the same way, while the words will have acquired their meaning by previously designating such an experience....Therefore when I receive information by reading a letter and when I ponder the message of the letter, I am subsidiarily aware not only of its text, but also of all the past occasions by which I have come to understand the words of the text, and the whole range of this subsidiary awareness is presented focally in terms of the message.[115]

Polanyi contends that the meaning of a word also displays a from-to relation – like all forms of tacit integration.[116] A word thus has meaning only because it "*bears on* something else which is its meaning."[117] Words point subsidiarily to the focal integration which is their meaning. Language then acts in the same way as maps, mathematical formulas, and so forth as subsidiaries bearing upon their focal meaning.[118] The meaning in language is found in a "focal comprehension of all the relevant instrumentally known particulars, just as the purpose of an action resides in the co-ordinated innervation of its instrumentally used particulars."[119]

When it comes to articulation, Polanyi distinguishes between the ineffable domain, the co-extensive domain and the domain of sophistication.[120] The ineffable domain refers to that area of our experience that cannot be articulated at all, where both knowledge and thought are predominantly tacit. This marks the limits to what can be articulated or expressed. These limits has to do with either the inability to tell the particulars apart (as in the case of riding a bicycle), or the inability to integrate the

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[115] Polanyi. *Personal Knowledge*: 92.

[116] Polanyi. *Personal Knowledge*: 100-02; Polanyi and Prosch. *Meaning*: 70.

[117] Polanyi and Prosch. *Meaning*: 69.

[118] Polanyi and Prosch. *Meaning*: 70. Of course this section only considers Polanyi's view of denotative language – the relation between the signifier and the signified. Metaphorical language is a different matter altogether. In the case of a metaphor both the subisidiary and the focal are of intrinsic interest, which complicates the relation of 'bearing upon.' See Polanyi and Prosch. *Meaning*: 72-81.

[119] Polanyi. *Personal Knowledge*: 92.

[120] Polanyi. *Personal Knowledge*: 87.

recognisable particulars into a whole (as in the case of the topography of the organs inside the human body).

In the second domain, tacit is co-extensive with the text of which it carries the meaning. Here the tacit component, upon which our awareness is focussed, is the meaning of the information conveyed by speech of which we are subsidiarily aware. The last domain is the area where articulation actually "encumbers the tacit work of thought", or it refers to situations that "outrun our understanding and thus anticipates novel modes of thought."[121] In both these cases one's tacit understanding does not resonate with the attempt to put it into words. Either one's concepts have to be sharpened or modified to fit the phenomenon on which it bears, or the phenomenon has to be reinterpreted in terms of the text.[122]

Here one finds another limit on articulation, namely that it is impossible to determine beforehand the scope of a word or the combination of words, since the scope of language is by nature indeterminate.[123]

> Much less can we control in advance the myriads of arrangements in which nouns, adjectives, verbs, and adverbs can be meaningfully combined to form new affirmations or questions, thus developing....the meaning of the words themselves ever further in these new contexts.[124]

This indeterminacy built into articulation, leads Polanyi to argue that not only do we know more than we can tell, but also that "we can never quite know what is implied in what we say."[125]

The extension of the above is that in Polanyi's view language is not merely the process of linguistic or symbolic representation of thought, language is also the

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[121] Polanyi. *Personal Knowledge*: 87.

[122] Polanyi. *Personal Knowledge*: 95.

[123] Polanyi. *Personal Knowledge*: 94.

[124] Polanyi. *Personal Knowledge*: 94.

[125] Polanyi. *Personal Knowledge*: 95.

"operation of symbols to assist in the process of thought."[126] Polanyi views language itself as a tool. And like all other tools language is itself dependent on the powers of tacit integration for successful performance. Thus the notion of tacit participates in the process of articulation. Viewing articulation then as a process of explicating the tacit, is to underestimate the function of tacit integration.

The notion of knowledge transfer between a sender and a receiver goes contrary to Polanyi's notion of tacit integration requiring an act of knowing. Information may well be packaged, but meaning is never packaged with that information. Meaning can only be produced at the moment of the act of integration. The meaning of a message is formed by integrating all the relevant subsidiary particulars, the separate words, the grammatical rules whereby they were ordered, the context, the receiver's interpretative skills, the past experiences of the receiver relating to the message, and so on – all these things are integrated to form the focal meaning of the message. Of some of these subsidiaries the receiver might be conscious, others might be unconscious, as we have seen above this difference is in itself not important; what is important is that meaning is produced when all of these subsidiary aspects are integrated into a whole. It therefore makes little sense in terms of Polanyi's framework to speak of knowledge transfer when referring to the process of communication. What would count as "explicit knowledge" in the mainstream knowledge management view of things, is not *transferred* in Polanyi's framework, but *integrated* from a multitude of tacit particulars.

Tacit integration does not only play a role in articulation itself, the benefit of language is that it provides opportunities for reflexive interaction with the knowledge produced by the act of tacit integration. Whereas mainstream knowledge management theory sees the enabling of knowledge transfer as the main benefit derived from articulation, one could plausibly claim that Polanyi thinks that the power of articulation lies in the interplay between knowledge and language. Language is a tool that gives human knowledge its recursive character.

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[126] Polanyi. *Personal Knowledge*: 87.

> [E]very use of language to describe experience in a changing world applies language to a somewhat unprecedented instance of its subject matter, and thus somewhat modifies both the meaning of language and the structure of our conceptual framework.[127]

This process of interaction between knowledge and language continually updates our interpretative frameworks. Our experience of the world is not merely assimilated into a fixed interpretative framework, but our frameworks are also adapted to include the lessons of our experience.[128] The lesson is of course that the fitter the framework proves to be given any number of experiences, the more unthinkingly it is used. In cases where the framework does not fit, it is tacitly updated, while the person is focally aware of the novel situation that is at hand.

> The adaptation of our conceptions and of the corresponding use of language to new things that we identify as new variants of known kinds of things is achieved subsidiarily, while our attention is focussed on making sense of a situation in front of us. Thus we do this in the same way in which we keep modifying, subsidiarily, our interpretation of sensory clues by striving for clear and coherent perceptions, or enlarging our skill without focally knowing how by practicing them in ever new situations.[129]

Language is constantly reinterpreted-in-use without the speakers of the language being focally aware of these changes. Polanyi actually describes languages as the product of "groping for words in the process of making new conceptual decisions, to be conveyed by words."[130] Different languages and dialects are then historically bound alternatives sustaining different conceptual frameworks used for interpreting the world.

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[127] Polanyi. *Personal Knowledge*: 104-05.

[128] Polanyi. *Personal Knowledge*: 105.

[129] Polanyi. *Personal Knowledge*: 112.

[130] Polanyi. *Personal Knowledge*: 112.

2.8 SUMMARY: THE ESSENCE OF THE ARGUMENT CONCERNING TACIT INTEGRATION

We know from Gestalt that when perceiving something, we recognise it by its borders and the difference between itself and the environment that forms its background. Although one's attention is focussed on the object in question, the perception against a background is made possible through one's reliance on a multitude of clues and the relation between those clues. These clues form secondary aspects that are part of the object, or that surround the object, and one does not focus directly on them, but one does have awareness of them. Polanyi says that our awareness of these secondary aspects is a *subsidiary* awareness, while our *focal* awareness remains on the whole.[131] One tacitly integrates the individual secondary aspects into the comprehensive entity that they jointly form. Consequently Polanyi argues that the interplay between the subsidiary and focal awareness makes perception possible.

A feature of the argument is that one's subsidiary awareness is *directed* by the integrating function of one's focal awareness. It is often impossible to specify the particulars of which one is subsidiarily aware. In addition, the meaning of an object lies in the coherence, and this leads Polanyi to identify the structure of all knowing as a *from-to* relation; one attends from the subsidiary parts to the focal whole which is the meaning of the parts.[132] Consequently, shifting one's focal attention from the whole to the parts destroys the comprehensive understanding.

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[131] Polanyi. Knowing and Being: 128,33-34,36; Polanyi. Tacit Knowing: Its Bearing on Some Problems of Philosophy: 164-65; Polanyi. Logic of Tacit Inference: 140,42,44,48,51; Polanyi. The Structure of Consciousness: 212-14,35,38; Polanyi. Sense-Giving and Sense-Reading: 182-84,93-95,98,204; Polanyi and Prosch. *Meaning*: 33-42,49,51,53-54,61,64,70,74-75,80,91,180.

[132] Polanyi. Logic of Tacit Inference: 140-41,45-48,51; Polanyi. The Structure of Consciousness: 214; Polanyi. Sense-Giving and Sense-Reading: 182,84-85,94; Polanyi and Prosch. *Meaning*: 34-42,48-49,51,54,59,61,70-72,74-76,97,98,137-38.

This structure of perception can now be applied to other forms of knowing. In the same way as one relies on the secondary aspects of an object when perceiving it as a whole, one also relies on one's body when perceiving things outside it. One's body cannot be experienced as a direct object. Instead one "experiences your own body in terms of the world to which [you are] attending from [your] body."[133] Thus in every act of perception one relies on your body as a subsidiary means for observing objects that lie outside the body. This insight forms the basis for Polanyi's *paradigm of indwelling*.[134] Just as one knows the external world by dwelling in your body, comprehensive entities are known by dwelling in their particulars, or even when handling tools (especially when expertly handled), they are treated as if they are extensions of one's body. Thus indwelling is the way one participates in comprehensive entities. Under these comprehensive entities count one's own body, the things one perceives, the objects one handles, even the theories one employs to understand the world and other people. In this sense one dwells in mathematical theory and knows it in a way analogous to Polanyi's description of how we dwell in our own bodies.

2.9 POLANYI'S CRITIQUE OF OBJECTIVISM IN PHILOSOPHY

In conclusion the importance of the concept of tacit knowledge for Polanyi's overall project – namely his critique of objectivism in philosophy – can be demonstrated.

The traditional epistemological strategy since Descartes (and onwards through Kant and Popper) has been to strip one's critique of knowledge of all presuppositions. Polanyi's criticism of this strategy involves the insight that all critique of knowledge

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[133] Polanyi and Prosch. *Meaning*: 36.

[134] Polanyi. *Personal Knowledge*: 59; Polanyi. Knowing and Being: 134,36; Polanyi. Tacit Knowing: Its Bearing on Some Problems of Philosophy: 160,62; Polanyi. Logic of Tacit Inference: 148-49,51-52,56; Polanyi. The Structure of Consciousness: 214,20-21; Polanyi and Prosch. *Meaning*: 37,45,54,61,138.

(all epistemology) presupposes knowledge. Which he derives from his argument that all explicit knowledge displays the same logical structure as tacit knowledge.

Polanyi expresses presupposed knowledge in terms of one's historical situatedness, which is present as inherited background practices that cannot be explicitly articulated in theoretical language. These background practices are so all encompassing and fundamental that they cannot be made an object of analysis, partly because these inherited practices involve embodied *skills*.[135] The "rules" of practice can only be transmitted by skilful practices that embody them. In other words they are an instance of tacit knowledge. Polanyi uses the term "cultural apprenticeship"[136] to describe the transmission of the tradition of personal knowledge. Thus objectifying (scientific) knowledge always refers back to some previous relation of participation in epistemology or science.

The question now is to what extent objectifying knowledge can free itself from the relation of participation that it refers to. Polanyi argues that total reflection is impossible, because the background is logically unspecifiable. Note that to some extent Polanyi, does not argue that presuppositions are logically inaccessible; they hold that presuppositions are simply not accessible as a complete set. One could conceivably explicate and analyse a single presupposition, but one cannot critically assess all of one's presuppositions simultaneously. This is so because even reflection on one's presuppositions has to take place in the context of presupposition. Of course there is a point at which analysis has to fail, because the notion of tacit knowing combines presuppositions and skills. In other words, cognitive skills and presupposition are dimensions of the same whole that breaks down upon analysis. Polanyi states:

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[135] Polanyi. *Personal Knowledge*: chapter 4.

[136] Polanyi. *Personal Knowledge*: 53,374-79.

> The curious thing is that we have no clear knowledge of what our presuppositions are and when we try to formulate them they appear quite unconvincing ... I suggest now that the supposed presuppositions of science are so futile because the actual foundation of our scientific beliefs cannot be asserted at all. When we accept a certain set of presuppositions and use them as our interpretative framework, we may be said to dwell in them as we do in our own body. Their uncritical acceptance for the time being consists in a process of assimilation by which we identify ourselves with them. They are not asserted and cannot be asserted, for assertion can be made only within a framework with which we have identified ourselves for the time being; as they are themselves our ultimate framework, they are essentially inarticulable.[137]

At this point it seems as if Polanyi opens himself to the charge of reckless cognitive relativism, but closer inspection reveals that the paradigm of indwelling is Polanyi's attempt to escape from the Cartesian split between subject and object, without resorting to all out cognitive relativism. At best it is a part solution, because indwelling constantly interiorises the objective. The dynamic relation between that which is experienced proximal and that which is experienced distal. By interiorising for instance an interpretative framework, the framework is no longer outside the self, one is dwelling inside it. It is important to note that only through a form of indwelling can an interpretative framework be used successfully. The framework that has been thus sufficiently interiorised can then be used for further acts of integration, continually giving meaning to events that lie outside the self. In this way the interpretative frames that people use, whether it is a theory or a language or an assumption about the world, are connected to the construction of the self. Polanyi's paradigm of indwelling views the construction of the self also as the construction of reality.

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[137] Polanyi. *Personal Knowledge*: 59-60.

On the whole the concept of tacit knowledge enables Polanyi to argue against Objectivism that scientific discovery cannot be properly explained through explicit inference alone. It seems that the concept of tacit knowledge functions in Polanyi's philosophy in much the same way as, for example, the concept of "paradigm" functions in Kuhn, "inherited background" in Wittgenstein, or "pre-understanding" and "tradition" in Gadamer's theories.[138]

[138] Turner, S. 1994. *The Social Theory of Practices: Tradition, Tacit Knowledge and Presupposition*. London: Polity

Chapter Three

IKUJIRO NONAKA: KNOWLEDGE CREATION AND KNOWLEDGE PROCESSING

The key to knowledge creation lies in the mobilization and conversion of tacit knowledge.

Ikujiro Nonaka & Hirotaka Takeuchi, "Knowledge Creating Company."

1.1 INTRODUCTION

This chapter focuses on Nonaka's theory of organisational knowledge creation and the explanatory function of the concept of tacit knowledge in this theory. Nonaka is a central figure, because a number of knowledge management theorists claim to base their theories on his modification of Polanyi's epistemology.[139] In the secondary discourse considering Nonaka's epistemological contribution to knowledge management, his theory is positioned as if it was intended to be a knowledge management theory.[140] Whilst Nonaka has been enormously influential in a certain

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[139] Amongst others: Baumard. *Tacit Knowledge in Organizations;* Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications; Weggeman, M. 1997. *Kennismanagement: Inrichting En Besturing Van Kennisintensieve Organisaties*. Schiedam: Scriptum

[140] Lubit. Tacit Knowledge and Knowledge Management: The Keys to Sustainable Competitive Advantage; Schreinemakers and Essers. Nonaka's Subjectivist Conception of

phase of knowledge management theory-building,[141] his work is probably best understood by interpreting it as the management application of research on the nature of dynamic firm capabilities.

Considering Nonaka's theory as the extension of theories on dynamic firm capabilities highlights the academic route along which the concept of tacit knowledge travelled from Polanyi to Nonaka. Therefore, in the argument here, Nonaka is positioned as the link between organisation theory applications of the concept of tacit knowledge and a particular school of knowledge management theorising, which also makes use of the concept of tacit knowledge. Therefore, this chapter consists of two sections.

The first section fills the gap between Nonaka and Polanyi by showing how the concept of tacit knowledge made its way through the resource-based theory of the firm, evolutionary economics, and dynamic firm capabilities, to find a place in Nonaka's theory of organisational knowledge creation. The aim in this section is to provide an outline of a conceptual history.

The second section describes and analyses Nonaka's theory and shows the explanatory function of the concept of tacit knowledge. Tracing the route that the concept followed from Polanyi through organisation theory to Nonaka, provides the background for conjecture on how the differences of theoretical function of the concept of tacit knowledge (between Nonaka and Polanyi) came about.

Knowledge in Corporate Knowledge Management; Tsoukas. Do We Really Understand Tacit Knowledge? ; Whitley and Hedesstrom. What Is Meant by Tacit Knowledge?

[141] Stacey. *Complex Responsive Processes in Organization*: 13.

1.2 NELSON AND WINTER: TACIT KNOWLEDGE AND ORGANISATIONAL ROUTINES

Nonaka and Takeuchi attempted to develop a "dynamic theory of organisational knowledge creation."[142] This emphasis on 'dynamics' establishes a link of sorts with the dynamic firm capabilities approach. The nature of this link will be elaborated in the following section. It also shows that Nonaka shares the assumption of evolutionary economists that dynamics is a methodological imperative.[143] In short, a dynamics approach holds that the explanation of phenomena is intimately tied to how those phenomena came into being.

It is well-known that Nelson and Winter's *Evolutionary Theory of Economic Change*[144] introduced Polanyi's concept of tacit knowledge to organisation theory.[145] However, Nonaka and Takeuchi inexplicably fails to note this fact in their central work, *The Knowledge Creating Company*, and in there only refer to Nelson and Winter's theory as part of a general discussion on the epistemology of organisation and management studies,[146] the outcome of which is to conclude that "[t]he subjective, bodily, and tacit aspects of knowledge are still largely neglected."[147] Yet, there are clear indications that Nonaka's thought can be understood as building on Nelson and Winter, such as Nonaka's earlier book on the theory of the firm whose translated title – *The Theory of Corporate Evolution* – echoes the title and concerns of Nelson and Winter's seminal

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142 Nonaka and Takeuchi. *The Knowledge-Creating Company*: chapter 3.

143 Dosi, G and B Coriat. 1998. The Institutional Embeddedness of Economic Change: An Appraisal of the 'Evolutionary' and 'Regulationist' Research Programmes, in Nielsen, K and B Johnson (eds.), *Institutions and Economic Change: New Perspectives on Markets, Firms and Technology*. London: Edward Elgar: 4.

144 Nelson and Winter. *An Evolutionary Theory of Economic Change*

145 A special issue of *Industrial and Corporate Change* considers the impact of Nelson and Winter's *An Evolutionary Theory of Economic Change* and their contribution to the nature of technological and organisational knowledge is reviewed in papers by Foss, Nightingale, Foray and Steinmuller. See, *Industrial and Corporate Change*, Volume 12, No 2 (2003).

146 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 34.

147 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 49.

work.[148] Later articles by Nonaka do refer to Nelson and Winter in the context of the phenomenon of tacit knowledge.[149] It is also in these later articles where Nonaka consciously positions his own theory as an extension of the dynamic capabilities approach to firms:

> Teece et.al. term such capability 'dynamic capability', i.e. a firm's ability to use existing firm-specific capabilities and to develop new ones. Dynamic capability provides a firm with the basis for its sustainable advantage over time The theory of the knowledge-creating firm needs to deal with such dynamic capability. The dynamic capability to create new knowledge out of existing knowledge can be accumulated only through....actually engaging in organisational knowledge-creating activities.[150]

Writers using the dynamic firm capabilities approach in turn openly claim that their approach is an extension of the resource-based view of the firm and specifically Nelson and Winter's research on firm capability. Teece writes: "We refer to this as the 'dynamic capabilities' approach.... Elements of the approach can be found in Schumpeter (1942), Penrose (1959), Nelson and Winter (1982)..."[151] It is therefore fair to assume that Polanyi's concept of tacit knowledge found its way into Nonaka's theory by way of the work of Nelson and Winter (evolutionary economics) and the

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[148] Nonaka, I. 1985. *Kigyo Sinka Ron (the Theory of Corporate Evolution)*. Tokyo: Nikkei Shinbunsya See citation in, Nonaka, I and R Toyama. 2002. A Firm as a Dialectical Being: Towards a Dynamic Theory of a Firm, *Industrial and Corporate Change* 11/ 5; Nonaka, I, R Toyama, and P Byosière. 2001. A Theory of Organizational Knowledge Creation: Understanding the Dynamic Process of Creating Knowledge, in Dierkes, M, et al. (eds.), *Handbook of Organizational Learning and Knowledge*: 491-517. Oxford: Oxford University Press

[149] Nonaka and Toyama. A Firm as a Dialectical Being: 1003; Nonaka, I, R Toyama, and A Nagata. 2000. A Firm as a Knowledge-Creating Entity: A New Perspective on the Theory of the Firm, *Industrial and Corporate Change* 9/ 1: 5,7.

[150] Nonaka, Toyama, and Nagata. A Firm as a Knowledge-Creating Entity: 7.

[151] Teece, D and A Shuen. 1997. Dynamic Capabilities and Strategic Management, *Strategic Management Journal* 18: 510. See also, Eisenhardt, KM and JA Martin. 2000. Dynamic Capabilities: What Are They?, *Strategic Management Journal* 21: 1114.

dynamic capabilities approach to explaining innovation in firms. Hence Nonaka's theory is interpreted in this light and not only as a knowledge management theory.

1.2.1 RESOURCE-BASED AND EVOLUTIONARY THEORIES OF THE FIRM

Resource-based approach to organisations argue that in an uncertain environment the only sustainable sources of competitive advantage are unique and difficult to imitate resources.[152] The fundamental resource of this type is a collection of technology, operating procedures and knowledge that is focussed on the organisation's primary reason for existence – these are collectively called 'core competencies.'[153] Core competencies are difficult to develop quickly and are probably harder to buy in, because the skills and knowledge that these competencies consist of are difficult to specify and often embodied in social routines. In other words, core competencies are *tacit* and *distributed*. Therefore, the *phenomenon* of tacit knowledge is clearly a consideration in the resource-based theory of the firm, but the *concept* of tacit knowledge (and with it Polanyi's epistemology) was not appropriated to the same extent as in knowledge management theory. The resource-based literature seem to prefer the concept "sticky knowledge" to the concept of tacit knowledge.[154][155]

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[152] Strategic management literature since the early 1990's tends to advocate a resource-based approach to strategy, but much of resource-based theory was already developed in the 1950's. See, Penrose, ET. 1959. *The Theory of the Growth of the Firm*. New York NY: Wiley

[153] The primary works on this would be Hamel, G and CK Prahalad. 1990. The Core Competence of the Corporation, *Harvard Business Review* 68. and Leonard-Barton, D. 1992. Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development, *Strategic Management Journal* 13; Leonard-Barton, D. 1995. *Wellsprings of Knowledge*. Boston MA: Harvard Business School Press

[154] For a study on "stickiness" of organisational knowledge, refer to Liebeskind, JP. 1996. Knowledge, Strategy, and the Theory of the Firm, *Strategic Management Journal* 17/ Winter Special Issue; Szulanski, G. 1996. Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm, *Strategic Management Journal* 17.

[155] One can speculate on the reasons why Polanyi's epistemology has not caught on in strategy literature to the same extent as in knowledge management literature. An article by Liebeskind on the institutional capabilities that renders knowledge sticky and offers better protection than markets, could imply that resource-based theory is the extension of transaction cost theory and thus operates with an orthodox view of organisations not really compatible with Polanyi's epistemology. See, Liebeskind. Knowledge, Strategy, and the Theory of the Firm.

By contrast Polanyi's epistemology lies beneath a related approach to organisations, namely the evolutionary theory of the firm. This is because the foundation of this approach to organisations, is the work of Nelson and Winter who directly based their approach on Polanyi.[156] Their analysis of skilful and/or routinised behaviour derive directly from Polanyi's argument that tacit knowledge displays the same structure as skills:

> [I]n Polanyi's Personal knowledge, the discussion of skills plays a role analogous to our own discussion here. It provides a useful perspective on other realms of knowledge – in his case, that of scientific knowledge; in ours, that of organisational capability.[157]

Tacit knowledge is used in Nelson and Winter's theory as the hinge-point for a critique of neoclassical economics. In line with Herbert Simon's information processing paradigm, orthodox theories explain firm behaviour in terms of choice optimisation within the parameters of certain objectives.[158] Evolutionary economists find that these assumptions constitute an abstraction that hampers the analysis of innovation. "The reduction of rationality to maximization makes it possible for the neoclassical economist to ignore the psychological and cognitive aspects of decision-making."[159]

Nelson and Winter tried to adapt Herbert Simon's theory of decision-making with the help of Polanyi's epistemological distinction between tacit and explicit knowledge.[160] They tried to highlight the importance of 'doing' (tacit skills) alongside

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156 Nelson and Winter. *An Evolutionary Theory of Economic Change*: 76.

157 Nelson and Winter. *An Evolutionary Theory of Economic Change*: 76.

158 Nelson and Winter. *An Evolutionary Theory of Economic Change*: chapter 3.

159 Dosi, G and L Marengo. 1994. Some Elements of an Evolutionary Theory of Organizational Competences, in England, RW (ed.), *Evolutionary Concepts in Contemporary Economics*. Michigan: University of Michigan Press: 167.

160 Foss, NJ. 2003. Bounded Rationality and Tacit Knowledge in the Organizational Capabilities Approach: An Assessment and a Re-Evaluation, *Industrial and Corporate Change* 12/ 2; Nightingale, P. 2003. If Nelson and Winter Are Only Half Right About Tacit Knowledge, Which Half? A Searlian Critique of 'Codification', *Industrial and Corporate Change* 12/ 2.

'deciding.' Herbert Simon views organisational routines, like standard operating procedures for example, as a bounded rationality mechanism to simplify the decision-making procedure.[161] Nelson and Winter, on the other hand, view organisational routines as repositories of organisational knowledge, know-how and skill. To them routines are simply patterns of interactions in response to problems encountered in the environment.[162] Both familiar and unfamiliar problems can only be responded to in terms of interactions that are already scripted in the organisation or for which a capacity already exists. In this sense organisations respond to their environment analogous to the way in which biological organisms do. This is why they call their theory an *evolutionary* theory.

Those organisational routines that are so effective that they are taken for granted are invariably social and tacit in nature. This perspective on organisational capability leads them to conclude that central aspects of human knowledge cannot (and indeed should not) be explicitly formulated. Consequently, neoclassical economists are mistaken in making these a basis for optimisation. Nelson and Winter use an analysis of the nature of skilful and/or routinised behaviour to criticise the orthodox view of individual and firm behaviour on the basis of the shortcomings of the notion of choice optimisation:

> [O]rthodoxy treats skilful behaviour ... as maximizing choice, and "choice" carries connotations of "deliberation". We, on the other hand, emphasize the automaticity of skilful behaviour and the suppression of choice it involves.[163]

It is clear that the advantages of skill are related to the suppression of deliberate choice, which confines behaviour to well-defined contexts and thus reduces option

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[161] Foss. Bounded Rationality and Tacit Knowledge in the Organizational Capabilities Approach: An Assessment and a Re-Evaluation: 191.

[162] Nelson and Winter. *An Evolutionary Theory of Economic Change*: 74-76.

[163] Nelson and Winter. *An Evolutionary Theory of Economic Change*: 94.

selection.[164] This echoes Polanyi's examples citing the destructive effect of focussing attention to the particulars rather than the comprehensive entity.

Instead of looking towards choice optimisation, Nelson and Winter, and other evolutionary economists, argue that innovation and the speed and direction of technical change can be much better understood in terms of an evolutionary learning process that is path-dependent. Innovation in a technological context is primarily seen as problem solving. The knowledge base in high-technology sectors is linked to the more tacit and specific knowledge of the innovative units of scientists who are at the forefront of developments in the field.[165] Moreover, in the knowledge base of "each technology there are elements of tacit and specific knowledge that are not and cannot be written down in a 'blueprint' form, and cannot, therefore be entirely diffused either in the form of public or proprietary information."[166] Therefore, this path dependency can once again be understood in terms of a tacit background that forms part of the initial state from which new states unfold.

1.2.2 Dynamic Capabilities

The dynamic firm capabilities approach refined Nelson and Winter's insight regarding the importance of firm capabilities by introducing a distinction between static and dynamic routines.[167] Routines are constantly updated, but as long as situations remain relatively familiar, organisations only have to replicate interactions as a response to the situation. These routines are static and clearly cannot be the source of innovation. In contrast, dynamic routines are patterns of interaction that

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[164] Nelson and Winter. *An Evolutionary Theory of Economic Change*: 85.

[165] Dosi, G. 1988. Sources, Procedures, and Microeconomic Effects of Innovation, *Journal of Economic Literature* 26/ 3: 69.

[166] Dosi. Sources, Procedures, and Microeconomic Effects of Innovation: 74.

[167] Eisenhardt and Martin. Dynamic Capabilities: What Are They; Mathews, JA. 2003. Competitive Dynamics and Economic Learning: An Extended Resource-Based View, *Industrial and Corporate Change* 12/ 1; Teece and Shuen. Dynamic Capabilities and Strategic Management.

involve experimentation and coordination, reconfiguration and integration of internal processes.[168]

It could be said that the insight of evolutionary economics regarding the development of strategically relevant organisational competencies combined with Schumpeter's notion of 'creative destruction,' would be roughly representative of the basic commitments of the dynamic capabilities approach to organisational innovation.[169] The dynamic capabilities approach does not view innovation as sophisticated problem-solving, but rather views innovation as the result of a continual internal reconfiguration of organisational capabilities.[170] Whereas the resource-based approach emphasised the competitive advantage derived from firm-specific capabilities, the dynamic capabilities approach tries to account for the actual processes by which organisations acquire and continually reconfigure their competencies. Consequently, and not surprisingly, the most important set of organisational capabilities are those that concern the development of new knowledge, usually in the form of organisational processes and products. In other words, dynamic capabilities are those capabilities connected to knowledge creation and the transformational potential that new knowledge holds for an organisation.[171]

With the organisational information processing view as basic assumption, information management was largely conceived of as the logistic support for organisational information processing. All forms of information organisation, whether a filing protocol or standard operating procedures connected to selected types of information, were aimed at controlling and enhancing diffusion and access to information.[172] Nonaka's theory stabs at this fundamental information processing assumption, because it emphasises the problem of new knowledge rather than the

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168 Eisenhardt and Martin. Dynamic Capabilities: What Are They?: 1107.

169 Teece and Shuen. Dynamic Capabilities and Strategic Management: 510.

170 Teece and Shuen. Dynamic Capabilities and Strategic Management: 515,16.

171 Teece and Shuen. Dynamic Capabilities and Strategic Management: 515.

172 The initial effect of the new information and communication technologies was to enhance the logistic function of information management. The amount and type of information that could be stored, manipulated and remotely accessed was massively increased.

processing of already existing knowledge.[173] Nonaka argues that more than just processing information from the environment, an organisation interacts with its environment.[174] This dynamic process of interaction continually reshapes both the organisation and its environment (through the process of knowledge creation).

Equally, more than mechanically responding to and solving problems as they arise, the issue of innovation becomes a question regarding the framing of problems and how organisations generate the new knowledge to solve those problems. A knowledge processing view of the organisation assumes already existing knowledge and thus focuses on the body of knowledge already available to the organisation.[175] Thus the knowledge processing view of the organisation cannot account for the creation of new knowledge; something the organisational capabilities approach seeks to correct. Thus, the dynamic capabilities insight that the ability to create and use knowledge is one of the most important sources of an organisation's competitive advantage, is the starting point of Nonaka's argument that individual tacit knowledge is the key to organisational learning. His theory of organisational knowledge creation outlines how individual learning is transformed into group knowledge and finally into organisational knowledge.

It is therefore clear that Nonaka's theory stands in a tradition that is primarily concerned with the problem of innovation as knowledge creation. It is also notable that the central authors in the case of evolutionary economics (Nelson and Winter) and in the case of dynamic firm capabilities (Teece) looked toward the concept of tacit knowledge to modify the information processing paradigm sufficiently to account for innovation.

From the above it seems reasonable to assume that Nonaka's use of the concept tacit knowledge is born from the need to explain the problem of innovation, namely the origin of new knowledge. Yet, most of the authors in early knowledge management

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[173] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 49-50.

[174] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 56.

[175] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 49.

theory seem to appropriate Nonaka's modification of Polanyi's concept of tacit knowledge as a term designating knowledge content that cannot be communicated as information. As a result an explanation is needed for how it came about that Nonaka's theory of innovation became the basis for various theories of knowledge dissemination during a particular stage of knowledge management theorising.

The next section will unpack the various elements of Nonaka's theory. It will be shown that the central element in Nonaka's theory implies two different arguments.[176] The primary argument is that management practices should provide the enabling conditions for the tacit realm to thrive, since that is the only source of new knowledge. The secondary argument relates to the fact that innovative organisations are those that succeed in turning the tacit knowledge of its members into tangible products (and thus explicit knowledge). This secondary argument places a premium on the conversion of tacit into explicit knowledge. Hence the emphasis moves from generating new knowledge (innovation) to codifying and diffusing existing knowledge (logistics). This analysis is then offered as an explanation as to why Nonaka's theory of knowledge *creation*, became the basis for various theories of knowledge *management*.

1.3 APPROACHING NONAKA

Nonaka's theory was restated a number of times since it was published in its original form in Japanese in 1990.[177] [178] These modifications were mostly the reconfiguration of

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[176] Retrospectively one can speculate that the germ of this contradiction is already present in the work of Nelson and Winter as the result of their attempt to graft Polanyi's epistemology onto Simon's information processing paradigm. All theories taking Nelson and Winter as starting point run the risk of this internal tension. Paul Nightingale has for instance noted that "the tensions that have followed Nelson and Winter's attempt to bring these two traditions together are consequences of the fact that Polanyi and Simon are incompatible because what they regard as 'real,' and consequently the nature of their explanations, is fundamentally different." See, Nightingale. If Nelson and Winter Are Only Half Right About Tacit Knowledge, Which Half?: 150.

[177] Nonaka, I. 1990. *Chishiki-Souzou No Keiei (A Theory of Organizational Knowledge Creation)*. Tokyo: Nihon Keizai Shimbun-sha. Naturally I could not consult this work since it is only available in Japanese, but I assume from the abstract that it was the first statement of

components that reappear in later versions of the theory as more or less complete units. The major components are the following:

- A distinction between tacit and explicit knowledge,[179] derived from Polanyi.
- Four modes of knowledge conversion between tacit and explicit knowledge, forming the SECI-model (after each of the four modes) and the knowledge spiral driving these conversions.[180]
- A description of the process of organisational knowledge creation, consisting of five phases.[181]
- A set of enabling conditions that facilitate the knowledge conversion tand hence contribute to the organisational knowledge creation process.[182]
- "*Ba*" (the context or space of knowledge conversion) - a later addition to the theory, which is interpreted as a response to critics.[183]

Nonaka's theory of organisational knowledge creation. This theory was first published in English a year later as: Nonaka, I. 1991. The Knowledge-Creating Company, *Harvard Business Review*/ Nov-Dec.

178 I consulted no less than seven publications in which Nonaka states his theory in some or other form. See, Nonaka. The Knowledge-Creating Company; Nonaka, I. 1994. A Dynamic Theory of Organizational Knowledge Creation, *Organization Science* 5/ 1; Nonaka, I and N Konno. 1998. The Concept of "Ba": Building a Foundation for Knowledge Creation, *California Management Review* 40/ 3; Nonaka and Takeuchi. *The Knowledge-Creating Company;* Nonaka and Toyama. A Firm as a Dialectical Being; Nonaka, Toyama, and Nagata. A Firm as a Knowledge-Creating Entity; Nonaka and Von Krogh. *Enabling Knowledge Creation*

179 Nonaka and Konno. The Concept of "Ba": 42; Nonaka and Takeuchi. *The Knowledge-Creating Company*: 56-61.

180 Nonaka and Konno. The Concept of "Ba": 42-45; Nonaka and Takeuchi. *The Knowledge-Creating Company*: 62-73; Nonaka and Toyama. A Firm as a Dialectical Being: 996-98; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 494-98; Nonaka, Toyama, and Nagata. A Firm as a Knowledge-Creating Entity: 10-11.

181 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 83-89.

182 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 73-83; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 508-11.

183 Nonaka and Konno. The Concept of "Ba"; Nonaka and Toyama. A Firm as a Dialectical Being: 1001-03; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 498-501; Nonaka, Toyama, and Nagata. A Firm as a Knowledge-Creating Entity: 8-9.

- A management style that is conducive to the process of organisational knowledge creation, called middle-up-down management style.[184]

- An organisational structure[185] that corresponds with the management style, called the hypertext organisational structure.

Reconfiguration of components notwithstanding, the backbone of the theory remains the SECI-model and its accompanying spiral of continuous knowledge conversions from tacit to explicit knowledge and back again. In this chapter the SECI-model will be the main focus. What will be left aside are the management style and organisational structure components as they are derivatives of the SECI-model and not directly concerned with tacit knowledge.

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[184] Nonaka and Takeuchi. *The Knowledge-Creating Company*: chapter 5; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 503-08.

[185] Nonaka and Takeuchi. *The Knowledge-Creating Company*: chapter 6; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 511-13.

Summary of Nonaka's theory showing its different components and how they relate to each other:

5 phases of knowledge creation	SECI-modes of knowledge conversion	"Ba" (platforms/context for knowledge creation)	Enabling Conditions (facilitating the phases of the process and the modes of interaction)
Sharing tacit knowledge	Socialization (tacit-tacit)	Originating Ba (face-to-face interaction)	Requisite variety of team members; redundancy of information; interpretation of organisational intention; management injects creative chaos by setting challenging goals and endows team members with autonomy.
Creating Concepts	Externalization (tacit-explicit)	Dialoguing Ba (peer-to-peer interaction)	Autonomy helps team members to diverge their thinking freely; intention ensures focus and convergent thinking; requisite variety provides different perspectives; fluctuation & chaos challenges established ways of thinking; redundancy of information aids understanding of figurative language.
Justifying Concepts	***	***	Justification criteria reflected in the organisational intention; the process is facilitated by redundancy of information about the intention.
Building an Archetype	Combination (explicit-explicit)	Systemizing Ba (group-to-group interaction)	Requisite variety and redundancy facilitate this process; intention converge various know-hows.
Cross-levelling of Knowledge	Internalization (explicit-tacit)	Exercising Ba (on-site interaction)	Autonomy enable units to apply knowledge developed elsewhere; fluctuation, redundancy and requisite variety internal to these units, facilitate the knowledge transfer.

Nonaka takes organisational practice and an organisation's worldview to be rooted in the subjective and tacit convictions, commitments and values of the members of the organisation.[186] As a result, all new ideas originate in these tacit commitments. In this sense, tacit knowledge is the wellspring of innovation and creativity.

The insight that new knowledge germinates in the unstructured subjective domain means that managerial control over the information flow could be detrimental to the knowledge creation process. It follows that management should be concerned with the provision and maintenance of conditions that are conducive to the elicitation of such tacit knowledge.

As a result Nonaka's theory incorporates a section on the "enabling conditions" that are necessary conditions for the knowledge spiral to take place. On the basis of these enabling conditions, an appropriate management style and a corresponding organisational structure is then outlined.

However, developing these new ideas into prototypes and eventually into products requires constant interaction between individuals, groups and eventually organisations. Nonaka's dynamic theory welds this process of interaction with the notion of tacit knowledge as a subjective resource, and argues that this process of interaction can and should be actively managed.

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[186] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 58.

> As we have stated repeatedly, an organisation cannot create knowledge by itself. Since tacit knowledge held by individuals is the basis of organisational knowledge creation, it seems natural to start the process by focussing on tacit knowledge, which is the rich, untapped source of new knowledge. But tacit knowledge cannot be communicated or passed onto others easily, since it is acquired primarily through experience and not easily expressed in words. Thus, the sharing of tacit knowledge among individuals with different backgrounds, perspectives, and motivations becomes the critical step for organisational learning to take place.[187]

The quoted paragraph reveals firstly that it is individuals who create knowledge, secondly that tacit and explicit knowledge are two distinguishable phenomena, thirdly that tacit knowledge can be converted into explicit knowledge, fourthly that, once converted, explicit knowledge is easier to communicate than tacit knowledge.

The linchpin of the theory is therefore the SECI-model outlining the various modes of interaction between these two kinds of knowledge, showing how the conversion from tacit to explicit and back again takes place, and accounting for the movement from the individual to the organisational knowledge level.

1.4 SECI MODEL OF KNOWLEDGE CONVERSION AND THE KNOWLEDGE SPIRAL

Nonaka's introduction of a spiral model of continuous knowledge conversion that describes the process of interaction between tacit and explicit knowledge goes beyond Polanyi's distinction between tacit and explicit knowledge. In the words of Tsoukas, Polanyi's conceptualisation of tacit and explicit is as flipsides, whilst in the mind of Nonaka they are opposites.[188] In the spiral model the process of interaction

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[187] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 85.

[188] Tsoukas. Do We Really Understand Tacit Knowledge?

leads to a continuous cycle of conversion of tacit knowledge to explicit knowledge and back again. Quite clearly this notion of continuous conversion does not correlate with Polanyi's view that the tacit dimension is logically unspecifiable. In Nonaka's model we are dealing with the interaction between two different kinds of knowledge content, tacit and explicit. This interaction takes place in the form of a knowledge spiral involving four modes of knowledge conversion – each of which is associated with a specific type of interaction.

1.4.1 SOCIALISATION

Socialisation is a mode in which tacit interacts with tacit. This is "a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills."[189] Socialisation is, therefore, a process in which tacit knowledge is experientially acquired directly from someone else's tacit knowledge. Learning takes place not through language, but through imitation and observation.[190] Essentially socialisation takes place during joint activities when participants share the same experience. The result of sharing the same experience is that participants forge a shared mental model and foster mutual trust.[191]

The importance of this mode of interaction to Nonaka's theory is not immediately apparent, but any explanation of social behaviour that appeals to a phenomenon such as tacit knowledge, must also provide a theory of how this tacit knowledge is transmitted *as tacit knowledge*. Without such an explanation the phenomenon of tacit knowledge loses its usefulness as an explanation for human behaviour, because if all knowledge *has* to be externalised before it can be transmitted at all, then one could adequately explain the phenomenon without resorting to the concept of tacit knowledge at all. It is therefore important to Nonaka's methodological assumption about the importance of the phenomenon of tacit knowledge that some form of tacit transmission of tacit knowledge is at least possible, even though it has limitations as a transmission mode.

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189 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 62.

190 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 62-63.

191 Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 495.

1.4.2 EXTERNALISATION

Externalisation concerns "the articulation of tacit knowledge as explicit knowledge."[192] Essentially externalisation is the process of "concept creation and is often triggered by dialogue or collective reflection."[193] This means expressing that which is tacit in terms of language, thus converting it to explicit. The conceptual tools available for articulating something inherently tacit are amongst others metaphors and analogies. Metaphor provides a way of grasping one thing in terms of another thing, whilst analogy links something unknown to something known.[194] Iterative rounds of expression and reflection sharpens the concepts distilled from the shared tacit knowledge produced in the previous mode, until these concepts can form the building blocks of a model.

The mode of externalisation is the focal point of Nonaka's theory. Even though new ideas can only be expected to be come across in the tacit realm, Nonaka insists that "[a]mong the four modes of knowledge conversion, externalization holds the key to knowledge creation, because it creates new, explicit concepts from tacit knowledge."[195] Although Nonaka starts and ends the explanation of the SECI-model with the tacit knowledge of the individual, the underlying logic of the spiral is driven by the requirements of organisational explicit knowledge. The demands for new knowledge made on the tacit realm are directed by the requirements of already existing explicit knowledge. The underlying assumption of the notion of knowledge *conversion* is clear: tacit knowledge is not-yet-realised explicit knowledge and from here the emphasis on externalisation follows naturally.

1.4.3 COMBINATION

Combination is the process of systemising and classifying new explicit knowledge in order to integrate it with the existing body of explicit knowledge. In other words,

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[192] Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 495.

[193] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 64.

[194] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 66; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 495.

[195] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 66.

explicit interacting with explicit knowledge.[196] This process of integration through "combining and categorising can create new knowledge."[197]

> In practice, combination entails three processes. First, explicit knowledge is collected from inside and outside the organisation and then combined. Second, new explicit knowledge is disseminated among the organisational members. Third, the explicit knowledge is edited or processed in the organisation in order to make it more useable.[198]

Essentially this mode of knowledge conversion involves the re-configuration of already existing explicit knowledge. The outcome is often in the form of a prototype, a model or a business system that incorporates the newly conceptualised idea into existing knowledge routines of the other parts of the organisation.[199]

1.4.4 INTERNALISATION

Finally, internalisation is a process of turning the new explicit knowledge into tacit knowledge. "When experiences through socialisation, externalisation and combination are internalised into individuals' [own] tacit knowledge bases in the form of shared mental models or technical know-how, they become valuable assets."[200]

The acting out of explicit knowledge in practice already starts the conversion of explicit into tacit knowledge. By participating in the process of product development part of the explicit knowledge used there is embodied in practice and thus internalised.[201] If first hand experience is not an option, it is possible to achieve this embodiment through simulation (emulating the experience) or some form of

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196 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 67; Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 497.

197 Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 497.

198 Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 497.

199 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 71.

200 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 69.

201 Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 497.

participation in the vicarious experience of another person (for example by reading a report).

The difficulty for Nonaka's theory is that the initial commitment to the primacy of tacit knowledge as the source of new knowledge implies that at a certain point some of what had to be explicated, in order to produce a product or deliver a service, has to be made tacit again to allow for the advancement of knowledge. In other words, the modes of externalisation and combination must in some way alter the tacit realm where its origins lie in order to affect future instances of innovation. The mode of internalisation thus allows the process to start again once the spiral ends in the tacit realm. "[T]he tacit knowledge accumulated at the individual level needs to be socialised with other organisational members, thereby starting a new spiral of knowledge creation."[202]

1.4.5 The Knowledge Spiral

In summary, tacit and explicit knowledge interact with each other in a spiralling process that continuously moves through these different modes of knowledge conversion. Nonaka calls this the epistemological dimension of knowledge creation.[203] To justify the claim that this is a theory of *organisational* knowledge creation and not merely a theory of individual creativity, the spiral process also needs to account for the "organisational amplification" and mobilisation of individual tacit knowledge.[204]

> Thus, organisational knowledge creation is a spiral process, starting at the individual level and moving up through expanding communities of interaction, that crosses sectional, departmental, divisional, and organisational boundaries.[205]

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[202] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 69.

[203] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 72.

[204] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 72.

[205] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 72.

For this reason the interactive process between tacit and explicit through the various modes of knowledge conversion, is not simply a circular movement, but a spiral one that moves from interaction on the individual, to the group, to the organisational level and so forth. Through the cross-levelling of knowledge, new spirals of knowledge creation are started.

1.5 FIVE PHASES OF ORGANISATIONAL KNOWLEDGE CREATION

In the original Harvard Business Review article on organisational knowledge creation, Nonaka and Takeuchi distilled their five phases of the process of knowledge creation from a case study involving the development of a bread-making machine.[206] The different modes of the SECI-model more or less fits the phases of the knowledge creation process.

1.5.1 SHARING TACIT KNOWLEDGE

Nonaka and Takeuchi assumes that strictly speaking organisations cannot create knowledge as a collective, ultimately innovation relies on ideas rooted in the mind of an individual. This assumption legitimates their interest in the phenomenon of (individual) tacit knowledge:

> Since tacit knowledge held by individuals is the basis of organisational knowledge creation, it seems natural to start the process by focussing on tacit knowledge, which is the rich untapped source of new knowledge.[207]

Accordingly the first phase in the process of organisational knowledge creation is the sharing of tacit knowledge among individuals. The difficulty in sharing this tacit knowledge relates to the observation that it "cannot be communicated or passed onto

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[206] Nonaka. The Knowledge-Creating Company.

[207] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 85.

others easily, since it is acquired primarily through experience."[208] From this follows firstly that in order for sharing of tacit knowledge to take place, individuals need to interact with each other in a face-to-face setting. Secondly it is implied that, although low in conscious communication, this co-located interaction is rich in the (wordless) exchange of experiences and perspectives. Thirdly, the notion of sharing implies that individuals possess sufficiently different backgrounds to make some sort of exchange possible, but share enough of a common frame of reference to facilitate the process of socialization.[209] The prevalent mode of knowledge conversion in this phase of knowledge creation is clearly the mutual conversion of tacit knowledge from individuals into the tacit knowledge of other individuals present in the field of face-to-face interaction – in other words the mode of Socialization.

1.5.2 Creating Concepts

Once the process of sharing tacit knowledge has led to the emergence of a shared mental model, it has to be articulated in a process of "collective reflection."[210] During this phase figurative language is used to verbalise knowledge content that was arrived at wordlessly. The corresponding mode of knowledge conversion is that of Externalisation and involves the conversion of tacit into explicit knowledge.

1.5.3 Justifying Concepts

Nonaka builds into the process of knowledge creation a "screening process" to determine "if the newly created concepts are truly worthwhile for the organisation and society."[211] Even though Nonaka claims in more than one place that in his theory of organisational knowledge creation, "knowledge is defined as justified true belief,"[212] he does not use the term 'justification' in the sense it is normally used in the philosophy of science and epistemology. The orthodox view of the problem of

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[208] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 85.

[209] From this it should be clear why the enabling conditions of Requisite Variety (pp.74-75) and Intention (pp.82-83) are necessary parts of Nonaka's theory.

[210] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 85.

[211] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 86.

[212] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 21, 58, 86.

justification concerns not only what humans can know, but *how* they can lay claim to true knowledge. Justification of knowledge is about the validation of knowledge by means of scientific verification. This method usually emphasises empirical proof (or at least testability), as well as pragmatic validation in the form of demonstrated explanatory power.

Clearly this is not the case for Nonaka's theory of knowledge creation. Nonaka's criteria for justification "include cost, profit margin, and the degree to which a product can contribute to the firm's growth,"[213] whilst other criteria might "include value premises such as adventure, romanticism, and aesthetical."[214] The justification criteria in an organisation thus falls under the auspices of organisational strategy and vision, hence the importance of the enabling condition of Intention.

As Essers and Schreinemakers[215] have pointed out, Nonaka's "subjective" understanding of the notion of knowledge justification opens his theory of knowledge creation to the problems of incommensurability and cognitive relativism.[216]

In terms of Nonaka's framework the problem of incommensurability refers to an unbridgeable gap between rivalling mental models – a possibility that Nonaka does not seem to consider. The resultant impossibility of communication is not only the result of perceptual and linguistic differences stemming from the different cognitive frameworks, but also the lack of a common reference point or "lack of common standards or lack of consensus on the .... priority of such standards."[217]

When it comes to the problem of cognitive relativism, Schreinemakers and Essers note that:

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[213] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 86.

[214] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 87.

[215] Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management.

[216] Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management: 28-29.

[217] Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management: 29.

> Nonaka threatens to run into a dangerous form of relativism and arbitrariness in the context of knowledge justification when the assessment standards he proclaims for knowledge creation are limited to purely economic or financial performance criteria.[218]

It is notable that this phase of the knowledge creation process does not fit any direct corresponding mode of knowledge conversion in terms of Nonaka's knowledge spiral. This adds weight to the reservations expressed by Schreinemakers and Essers regarding the utility of Nonaka's model for corporate knowledge management and organisational innovation.

1.5.4 Building an Archetype

Assuming however that the concept is justified along the criteria posed by Nonaka, the next step would be to convert it into an archetype. Depending on the concept, the archetype can be a model or a prototype.[219] Essentially this phase in the process involves the utilisation of existing explicit knowledge to give the newly explicated concept a tangible form. Since this phase involves the integration of new explicit knowledge with the body of explicit knowledge already available, it corresponds with the mode of Combination.

1.5.5 Cross-levelling Knowledge

The process of organisational knowledge creation is not complete at this point, since the knowledge embodied in the archetype "can trigger a new cycle of knowledge creation."[220] This last phase is called the "cross-levelling of knowledge." On one level it is the transfer and application of newly developed knowledge in areas where it was not originally intended for. On another level it is the absorption of the new explicit knowledge by individuals so that it affects their tacit knowledge base, which in turn

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[218] Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management: 32.

[219] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 87-88.

[220] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 88.

introduces the possibility of another cycle of innovation.[221] This phase relates to the mode of Internalisation and involves the conversion of explicit knowledge back into tacit knowledge, thus completing one round of the knowledge spiral.[222]

1.6 THE CONCEPT OF "BA"

In a later version of Nonaka's model the five-phase process of knowledge creation is replaced by a three-layered knowledge creation process.[223] In this version the SECI-model takes place in the context of *Ba* (platforms for knowledge creation) and utilises knowledge assets that in turn moderates the *Ba* -contexts. Despite these adjustments, the SECI-model is retained as a unit in its entirety. For that reason, these adjustments to Nonaka's theory do not really change its character. A digression on the notion of *Ba* is after all worthwhile, since it displays a particular blind spot that Nonaka has regarding the ontological implications of Polanyi's epistemology.

Ba is "the context in which knowledge is shared, created and utilized, in recognition of the fact that knowledge needs a context in order to exist."[224] Each mode of knowledge conversion in the SECI-model then has a corresponding shared space of interaction. "Originating *Ba* is the place where individuals share feelings, emotions, experiences, and mental models,"[225] and clearly corresponds to the face-to-face context of the mode of Socialization in the SECI-model. "Interacting *Ba* is the place where tacit knowledge is made explicit,"[226] and thus corresponds with the mode of externalisation. Since the integration of various kinds of explicit knowledge is "most efficiently supported in collaborative environments utilizing information

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221 The notion of cross-levelling of knowledge is similar to Kogut and Zander's ideas on combinative capabilities, meaning the generation of new applications from existing knowledge. See, Kogut, B and U Zander. 1996. What Firms Do? Coordination, Identity, and Learning, *Organization Science* 7.

222 Nonaka and Takeuchi. *The Knowledge-Creating Company*: 89.

223 Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation.

224 Nonaka, Toyama, and Byosière. A Theory of Organizational Knowledge Creation: 499.

225 Nonaka and Konno. The Concept of "Ba": 46.

226 Nonaka and Konno. The Concept of "Ba": 47.

technology," the mode of combination is taking place in "Cyber *Ba*."[227] Lastly "Exercising *Ba*" supports the mode of internalization.[228]

At first glance the concept of *Ba* seems an unnecessary introduction of a further element of mysticism to the SECI-model. The point to recognise however, is that the concept of *Ba* was introduced to counter allegations that the SECI-model effectively amounts to relativism, because there are no justification criteria independent from the strategic vision of the management of the organisation.[229]

> Nonaka attempted to restate his more holistic and dialectical view of tacit and explicit knowledge when he republished the model utilising the Japanese word *Ba*, but by this time the simple two by two of the SECI model was too well established in business plans, software brochures and the structured methods of consultants to be restored to its original intent.[230]

According to Nonaka and Konno, "*Ba* may also be thought of as the recognition of the self in all."[231] Thus participation in *Ba* implies transcendence of one's own limited perspective. In the words of Nonaka: "Within *Ba*, real-time knowledge creation is achieved through self-transcendence."[232] The concept of *Ba* is therefore Nonaka's attempt to show that his epistemology is not properly understood when called "subjectivist."[233] It seems as if Nonaka appropriated Polanyi's epistemology, but not the ontology from which it derives. "Nonaka and Takeuchi were only seeking to contrast a claimed Japanese tradition of 'Oneness' with a rational, analytical and

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227 Nonaka and Konno. The Concept of "Ba": 47.

228 Nonaka and Konno. The Concept of "Ba": 47.

229 Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management.

230 Snowden. Complex Acts of Knowing: 101.

231 Nonaka and Konno. The Concept of "Ba": 40.

232 Nonaka and Konno. The Concept of "Ba": 45.

233 Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management.

Cartesian western tradition."[234] Nonaka's ontology stresses the "oneness of Humanity and Nature", the "oneness of Body and Mind" and the "oneness of Self and Other."[235]

With this ontology in mind, Nonaka sees the organisation as "an organic configuration of (various) *Ba* instead of organisational structure."[236] As a result the knowledge-creating process is not a matter of anything goes, but through participation in various *Ba*, is necessarily context specific, yet provides participants with the means for transcending the immediate context.[237]

One cannot draw a direct comparison between the concept of *Ba* and the ontological aspects of the concept of tacit knowledge in the theory of Polanyi, but both concepts can be interpreted as attempts to circumvent the subject-object split. Polanyi achieves this by arguing that all knowledge is grounded in the practices that constitute tacit knowledge, thus effectively collapsing the objective in the subjective. The importance of the notions of tradition and cultural apprenticeship provides the cognitive limiting factors guarding against the charge of 'anything-goes' relativism. The fact that Nonaka has to resort to Japanese philosophy and the concept of *Ba*, whilst the conceptual tools were already available to him in the theory of Polanyi, underlines the fact that Nonaka's did not retain the full implications of Polanyi's conceptualisation of the concept of tacit knowledge.

1.7 COMPARING NONAKA WITH POLANYI

The differences with Polanyi become apparent early on, as Nonaka introduces an iceberg metaphor to distinguish between tacit and explicit knowledge, when it is claimed that "knowledge expressed in words and numbers represents only the tip of the iceberg."[238] The iceberg metaphor seems to suggest that knowledge is inherently

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[234] Snowden. Complex Acts of Knowing: 101.

[235] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 59.

[236] Nonaka and Toyama. A Firm as a Dialectical Being: 1001.

[237] Nonaka and Toyama. A Firm as a Dialectical Being: 1002.

[238] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 8.

tacit or inherently explicit. This vision of tacit and explicit knowledge as a sharp dichotomy, is alien to Polanyi's own understanding.[239] Tsoukas argued that management studies have largely misunderstood what Polanyi meant with the concept of tacit knowledge by conceiving of it "in opposition to explicit knowledge, whereas it is simply its other side."[240]

Brohm argues that the iceberg metaphor misrepresents the relation between tacit and explicit knowledge.[241] He proposes the metaphor of a theatre stage that has a certain setting, actors, props, a script and so forth, but everything is not always in focus, through the use of lighting, positioning of actors, dialogue and stage direction a certain focus is established. Naturally this focus changes during the course of the play, bringing elements from the background into focus in turn. Brohm uses the stage then as a metaphor to describe the Polanyi's conception of the relation between tacit and explicit knowledge:

> The focus reflects explicit knowledge, while the rest of the stage, functioning to support that focus, reflects tacit knowledge.... Just like the focus on the stage is a result of the skill of the stage manager, integrating separate elements on the stage into one focal point, explicit knowledge results from a mental and skilful act of integration, integrating subsidiary parts into a coherent entity.[242]

Brohm does not have the conversion of tacit knowledge in mind. With the shift of focus, he tries to show that Polanyi used the concept of tacit knowledge to describe the logical structure of knowledge. Seen in this perspective tacit knowledge always

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239 There is a whole discourse on the differences between Nonaka and Polanyi. See, Brohm. Bringing Polanyi onto the Theatre Stage, ; Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management; Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications; Tsoukas. Do We Really Understand Tacit Knowledge? ; Whitley. Tacit and Explicit Knowledge.

240 Tsoukas. Do We Really Understand Tacit Knowledge?

241 Brohm. Bringing Polanyi onto the Theatre Stage,

242 Brohm. Bringing Polanyi onto the Theatre Stage: 3.

underlies explicit knowledge. Saying that for some knowledge to be in focus (explicit) there has to be a background (tacit knowledge), does not amount to saying that the background cannot be brought into focus. But it does mean that it can only be brought into focus if some other elements forms a background against which it can be off-set. On the basis of the analysis of Polanyi in the previous chapter, one could say that Brohm is optimistic about the specifiability of tacit knowledge, yet his example of the theatre stage underlines the fundamental difference between conceiving of tacit knowledge as a knowledge content, which can be converted into explicit content, and tacit knowledge as the logical structure underlying explicit knowledge.

1.7.1 ENABLING TACIT GERMINATION VS MOBILISING TACIT CONTENT

Nonaka's central argument is that knowledge management practices should aim at providing "enabling" organisational conditions for the tacit dimension to thrive, because new ideas germinate in the unstructured subjective domain of human existence.[243] Explaining the creation of new knowledge is the stated primary concern of Nonaka and Takeuchi's dynamic theory. However, as Stacey points out, Nonaka actually only defers the explanation of the origin of new knowledge to the tacit realm.[244] Upon closer analysis, Nonaka's theory of *organisational* knowledge creation fails to adequately explain the creation of knowledge at the *individual* level. The origin of the new tacit knowledge in the head of the individual is not properly explained. Stacey shows how Nonaka's model relies on a distinction between individual and organisational levels of analysis that makes it difficult to see this shortcoming in explanatory power.

The phenomenon of tacit knowledge is linked to the individual and does not have a collective equivalent. Tacit knowledge is therefore not the same as organisational knowledge. By contrast, the routines in the work of Nelson and Winter and the dynamic capabilities in the work of Teece were instances of organisational knowledge that is both social and tacit. The way Nonaka sees it, an organisation

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[243] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 73-83.

[244] Stacey. *Complex Responsive Processes in Organization*: 14.

feeds off the knowledge of its members. In other words, organisational knowledge depends on the individual tacit knowledge contained in the heads of its members.

> [An organisation can only be said to know, in as much as it] amplifies the knowledge created by individuals and crystallises it as part of the knowledge network of the organisation. This process takes place within an expanding 'community of interaction' which crosses intra- and inter-organisational levels and boundaries.[245]

The link between the individual and the organisational levels is thus understood as the process of interaction between individuals. It is exactly this process of interacting that the SECI-model tries to explain. Nonaka's knowledge spiral promotes a view of individuals constructing (through the modes of externalisation and combination) the explicit organisational levels of knowledge, which then through the mode of internalisation affect the tacit knowledge sets of the individuals.[246]

Comparing the case of Nonaka with the way in which the concept is used in the work of Nelson and Winter, one will see that for the evolutionary economists tacit knowledge contains the possibilities for innovation, because the tacit knowledge/skills complex represents a major component of the initial conditions for any new discovery. Attempts to account for the lock-in effect of these initial conditions often lead to sophisticated theories of path dependence in most evolutionary theories.[247] Although Nonaka looks to tacit knowledge to explain the same problem of innovation, he portrays tacit knowledge as the source of innovation and creativity without explicitly considering the limiting factors built into any notion of initial conditions. Consequently, as part of Nonaka's model, the concept of tacit knowledge has little technical significance other than serving as a *label* for the

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[245] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 59.

[246] Stacey. *Complex Responsive Processes in Organization*: 15.

[247] Nooteboom, B. 1997. Path Dependence of Knowledge: Implications for the Theory of the Firm, in Magnusson, L and J Ottosson, *Evolutionary Economics and Path Dependence*. Cheltenham: Edward Elgar

subjective domain that is the source of new knowledge, yet at the same time is inaccessible to analysis.

Not only is the function of the concept of tacit knowledge in Nonaka's theory limited to being a mere label for the creative subjective resource from whence new knowledge emerge, but also the SECI-model attributes greater importance to knowledge transmission than other theories primarily concerned with innovation.

Explaining the relation between tacit and explicit knowledge in terms of the spiral process of interaction leads to a secondary argument, namely that innovative organisations are those that succeed in tapping and mobilising the tacit knowledge of their members. Logically, this leads to knowledge management practices that actively seek to externalise (codify) the tacit knowledge of the organisation, rather than enable the ripening of tacit knowledge. In other words, it might be individuals who create new knowledge, but seen from an organisational perspective the main problem is leveraging that individual insight throughout the organisation. This leads to practices aimed at capturing, storing and sharing individual knowledge. In terms of intellectual capital theory it leads to practices to turn human capital into forms of structural capital. The primary concern moves from generating new knowledge (innovation) to codifying and diffusing existing knowledge (logistics).

For Polanyi the activities of innovation and problem solving have more to do with his notion of personal knowledge and the commitment that it signifies on the part of the knower (scientist) than with the technical term of "tacit knowing". In fact, Polanyi resorted to the term "tacit *knowing*" rather than "tacit knowledge" to show that the relation has to do with two different kinds of *awareness* rather than two different forms of *content* of knowing. While Polanyi explained the relation between the tacit and explicit dimensions in logical terms, Nonaka's spiral model tries to describe the process of interaction and transmission in practical terms. Thus, combining an epistemological distinction between tacit and explicit knowledge with the spiral process of interaction fits neatly with the knowledge processes of generation, diffusion and application in organisations.

The dual nature of Nonaka's theory, part knowledge creation theory and part knowledge processing theory, accounts for the success and the partial misinterpretation of Nonaka's theory as the basis for knowledge processing application at the expense of knowledge creation. Almost directly opposite to the knowledge creation concerns that were Nonaka's starting point.

1.7.2 Conclusion

This chapter showed how the concept of tacit knowledge underwent a number of small adjustments, from its first adaptation by Nelson and Winter as part of a critique of neoclassical theories of the firm, to its role as part of a critique of the information processing paradigm by scholars using the dynamic firm capabilities approach, and lastly to its superficial role as the label for individual creativity in Nonaka's theory. It was also shown how these small adjustments ironically allowed the information processing paradigm to exact revenge on Nonaka's application of the concept of tacit knowledge, in that Nonaka stripped the concept of theoretical functions other than being a conceptual label for the black box of human creativity. As a result Nonaka's theory was vulnerable to over-interpretation and was eventually fitted into an objectivist information processing paradigm. Snowden neatly summarises the dilemma of Nonaka's theory:

> [Nonaka's] work derived in the main from the study of innovation in manufacturing processes where tacit knowledge is rendered explicit *to the degree necessary to enable that process to take place*; it did not follow that all of the knowledge in the designers' heads and conversations had, should or could have been made explicit. In partial contrast, early knowledge programmes attempted to disembody all knowledge from its possessors to make it an organisational asset.[248]

Fact remains that Nonaka's theory became very popular, because it combined such a wide array of approaches to organisations. The different modes of Nonaka's knowledge spiral each appeals to a different sector of organisation theory. Nonaka

[248] Snowden. Complex Acts of Knowing: 101.

and Takeuchi anticipated that the mode of socialisation could be "connected with theories of group processes and organisational culture."[249] In turn the mode of combination resonates with information processing, and the mode of internalisation with organisational learning.[250] That leaves the mode of externalisation, an area that Nonaka and Takeuchi regarded as neglected. They formulated their theory of organisational knowledge creation to correct this neglect of externalisation.[251] In retrospect one can argue that the notion of convertible tacit knowledge was favourably received at a certain point of maturation of knowledge management theory when the main concern was with turning individual knowledge into organisational assets. Hence the mode of externalisation filled a gap at an appropriate time.

Nevertheless the primacy ascribed to the mode of externalisation is based on a particular view of the nature of knowledge and an accompanying model of communication. These will be considered in the next chapter that illustrates how the secondary concern of knowledge conversion in Nonaka's theory, became a primary concern in post-Nonaka knowledge management theory.

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[249] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 62.

[250] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 62.

[251] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 62.

Chapter Four

THE RECEPTION OF TACIT KNOWLEDGE IN KNOWLEDGE MANAGEMENT THEORY

As difficult as it is to codify tacit knowledge, its substantial value makes it worth the effort.

Thomas Davenport & Larry Prusak, "Working Knowledge."

1.1 INTRODUCTION

This chapter aims to put forward the principal results and implications flowing from the conceptual analysis in the previous two chapters. The conclusions reached regarding the role of the concept of tacit knowledge in the theories of Polanyi and Nonaka are illustrated by gauging the reception of the concept of tacit knowledge in post-Nonaka knowledge management theory. Even though the concept of tacit knowledge is subject to varied and inconsistent application in organisation theory, there is a trend in knowledge management theory of writers using the concept of tacit knowledge as "an almost default epistemology."[252]

Rather than specifying a collection of knowledge management writers, the illustration is drawn from the commentary of another set of writers – chiefly

[252] Stacey. *Complex Responsive Processes in Organization*: 13.

Haridimos Tsoukas,[253] Ralph Stacey,[254] Jos Schreinemakers,[255] and René Brohm[256] – whose viewpoints criticise this trend in knowledge management theory that, in their opinion, more or less build on Nonaka's theory.[257] [258] Rather than dealing directly with individual knowledge management authors, this chapter aligns with the viewpoints of this group of commentators. Their interpretation of a 'post-Nonaka'-trend in knowledge management theory is used to illustrate the impact of Nonaka's adaptation of Polanyi's conception of tacit knowledge on the reception, and eventual function, of the concept in knowledge management theory.

1.2 KNOWLEDGE AS 'NOT – INFORMATION'

The analysis of Nonaka concluded with showing that the dynamic firm capabilities tradition, through which Nonaka became familiar with the concept of tacit knowledge, is concerned with explaining the generation of new knowledge, something which the information processing view of organizations largely ignores. Thus, it was concluded that viewing Nonaka in terms of the tradition of dynamic

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253 Tsoukas. The Firm as a Distributed Knowledge System; Tsoukas. Do We Really Understand Tacit Knowledge?

254 Stacey. *Complex Responsive Processes in Organization*

255 Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management.

256 Brohm. Bringing Polanyi onto the Theatre Stage,

257 Tsoukas considers Nonaka and Takeuchi to be "the two authors who, more than anyone else, have helped popularise the concept of 'tacit knowledge' in management studies and whose interpretation has been adopted by most management authors (see for example, Ambrosini and Bowman, 2001; Baumard, 1999; Boisot, 1995; Davenport and Prusak, 1998; Devlin, 1999; Dixon, 2000; Leonard and Sensiper, 1998; Spender, 1996; von Krogh et al, 2000 for exceptions see, Brown and Duguid, 2000; Cook and Brown, 1999; Kreiner, 1999; Tsoukas, 1996; 1997; Wenger, 1998)." See, Tsoukas. Do We Really Understand Tacit Knowledge?

258 Stacey also considers Nonaka pivotal for knowledge management theory: "[Nonaka] relies heavily on [a] distinction between tacit and explicit knowledge.... [and is] widely quoted in many academic papers and also in the more popular books....I will refer to this body of work as the mainstream literature on organisational learning/knowledge creation because it has now become commonplace ....to think and talk either within its terms or in critique of it.... In drawing out the main features of the underlying frame of reference in mainstream thinking, I turn to....a sample of writers for practitioners who rely on concepts from that literature (Brown, 1991; Burton-James, 1999; Davenport and Prusak, 1998; Garven, 1993; Kleiner and Roth, 1997; Leonard and Strauss, 1997; Quinn *et.al.*, 1996; Sveiby, 1997)." See, Stacey. *Complex Responsive Processes in Organization*: 13-14.

firm capabilities, the concept of tacit knowledge describes the source or *wellspring* of individual creativity. However, it was shown that, unlike his predecessors in evolutionary economics and dynamic firm capabilities, Nonaka's theory does not fully account for the origin of new knowledge, other than consign it to the unstructured realm of *individual* ideas, memories, dreams, and desires. Instead Nonaka's theory assumes the continual generation of new knowledge in the tacit realm (located in the heads of individuals) and then describes the process of interaction that leads to *organisational* knowledge creation.

The SECI-model explains this process of interaction between tacit and explicit knowledge and also individual and organisational (social) knowledge. Snowden argues that this SECI-model of interaction provided early knowledge management theory with the theoretical grounding that it needed:

> To all intents and purposes, knowledge management started circa 1995 with the popularisation of the SECI model [of Nonaka and Takeuchi] with its focus on the movement of knowledge between tacit and explicit states...[259]

Nonaka's SECI-model combines the idea of new tacit knowledge content, that can be converted into explicit content, with the spiral movement of that knowledge from the level of the individual to the level of the organization. This model of interaction between different kinds of knowledge and different organisational levels fit well with the concerns of knowledge creation, codification, and transfer, which are typical of knowledge management. As a result, Nonaka's distinction between tacit and explicit knowledge became a theoretical foundation for a large body of knowledge management theory.

Yet, Hedesstrom and Whitley pointed out that "the literature on knowledge management is particularly vague about what is meant by tacit knowledge."[260] The distinction between tacit and explicit knowledge seems to relate to the degree of

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[259] Snowden. Complex Acts of Knowing: 101.

[260] Whitley and Hedesstrom. What Is Meant by Tacit Knowledge?

formalisation, or potential for formalisation, of knowledge. While most knowledge management writers seem to agree that tacit knowledge is embodied knowledge and in this sense resides in people, there are differences of opinion as to why this is the case. Hedesstrom and Whitley argue that most knowledge management writers can be grouped into two schools of thought on this issue. They argue that the dominant view in knowledge management theory is one that sees tacit knowledge simply as knowledge that has *not yet* been formalised.[261]

This idea that all tacit knowledge *could* be formalised is already present in Nelson and Winter, because in their theory this issue does not appear to have any bearing on the inherent characteristics of tacit knowledge. Instead they argue that cost factors determine whether or not tacit knowledge become formalised:

> Whether a particular bit of knowledge is in principle articulable or necessarily tacit is not the relevant question in most behavioural situations. Rather the question is whether the costs associated with the obstacles to articulation are sufficiently high so that the knowledge in fact remains tacit.[262]

According to this view then, tacit knowledge might be difficult to externalise, but it is – at least theoretically – possible. It corresponds with Nonaka's own view of the phenomenon of tacit knowledge. The difficulty involved with articulating tacit knowledge is the reason why Nonaka stresses the importance of figurative and metaphorical language during the mode of externalisation.

According to Heddesstrom and Whitley there is a minority viewpoint on the nature of tacit knowledge in knowledge management theory and this group of writers see the phenomenon of tacit knowledge as knowledge that *cannot* be codified. This is either because the knowledge relies on embodied skills, or because it is a form of knowledge that is beyond the powers of language.[263] Hedesstrom and Whitley

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261 Whitley and Hedesstrom. What Is Meant by Tacit Knowledge?

262 Nelson and Winter. *An Evolutionary Theory of Economic Change*: 82..

263 Whitley and Hedesstrom. What Is Meant by Tacit Knowledge?

conclude that despite this ambivalence with regard to the concept of tacit knowledge, it makes little difference whether authors maintain that tacit knowledge is knowledge that is *impossible* to codify or simply knowledge that has *not yet* been codified. The flipside remains that:

> Explicit knowledge is predominantly thought of as knowledge that is possible to articulate or formalise. Some authors use the term 'codified knowledge' instead of 'explicit knowledge' for all knowledge that is not tacit. Some of these scholars equate codified knowledge with knowledge that de facto has been articulated/written down, while others refer to it as knowledge that is...codifiable.[264]

Brohm also cites a number of examples of writers that equates articulated or codified knowledge with the explicit knowledge category from Nonaka, and see tacit knowledge as that which is hard or impossible to codify and therefore transmit as information, "[e]xamples are amongst others Weggeman (1997), Raelin (1997), Inkpen (1996) or Leonard (1998)."[265] [266] Brohm also points to what he considers to be even more extreme examples of writers who speak "of knowledge assets that can be transferred."[267] Here he points to Boisot and Davenport and Prusak.[268]

It appears as if the function of the concept of tacit knowledge in the theories of post-Nonaka knowledge management writers, is closely linked to the way they attempt to distinguish between information and knowledge. Quite a number of writers view tacit knowledge as knowledge that has not yet been formalised and therefore it

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[264] Whitley and Hedesstrom. What Is Meant by Tacit Knowledge?

[265] Brohm. Bringing Polanyi onto the Theatre Stage: 4.

[266] The references for these writers are, Inkpen, A. 1996. Creating Knowledge through Collaboration, *California Management Review* 39/ 1; Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Raelin, J. 1997. A Model of Work-Based Learning, *Organization Science* 8/ 6; Weggeman. *Kennismanagement*

[267] Brohm. Bringing Polanyi onto the Theatre Stage: 4.

[268] Boisot, M. 1995. *Information Space: A Framework for Learning in Organizations, Institutions and Culture*. London: Routledge; Davenport, T and L Prusak. 1998. *Working Knowledge: How Organizations Manage What They Know*. Boston MA: Harvard Business School Press

cannot be readily communicated as information. [269] One such writer is Mathieu Weggeman and the points made above can be illustrated by reviewing the way in which he modifies Nonaka's theory.

According to Weggeman, knowledge is a personal capacity that has to be seen as the product of information, experience, skills and attitude that a person commands at a particular point in time. He expresses this formulation in the following equation: K=I.ESA.[270] He then proceeds to liken the information component to Nonaka's explicit knowledge. Weggeman does not work with a formal definition of information, but means with it knowledge that can readily be written down or expressed in the form of symbols.[271] The crucial feature of explicit knowledge is then that it can be turned into person-*in*dependent information which can be communicated free from the constraints of embodiment.[272] The ESA-component of the equation, which includes experience, skills and attitude, is then linked with Nonaka's understanding of tacit knowledge.

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[269] See for example the use of the concept by the following writers, Ambrosini and Bowman. Tacit Knowledge: Some Suggestions for Operationalisation; Baumard. *Tacit Knowledge in Organizations;* Haldin-Herrgard. Difficulties in Diffusion of Tacit Knowledge in Organizations; Herschel, Nemati, and Steiger. Tacit to Explicit Knowledge Conversion: Knowledge Exchange Protocols; Jankowicz. Why Does Subjectivity Make Us Nervous? Making the Tacit Explicit; Johannessen, Olaisen, and Olsen. Mismanagement of Tacit Knowledge: The Importance of Tacit Knowledge, the Danger of Information Technology, and What to Do About It; Leonard and Sensiper. The Role of Tacit Knowledge in Group Innovation; Saint-Onge. Tacit Knowledge: The Key to the Strategic Alignment of Intellectual Capital; Schariq. How Does Knowledge Transform as It Is Transferred? Speculations on the Possibility of a Cognitive Theory of Knowledge Landscapes; Smith. The Role of Tacit and Explicit Knowledge in the Workplace.

[270] Weggeman. *Kennismanagement*: 33.

[271] Weggeman. *Kennismanagement*: 34.

[272] Weggeman. *Kennismanagement*: 34.

> "*Tacit knowledge* is persoonlijke kennis die moeilijk te formaliseren is en daardoor niet goed te delen met anderen. Subjectieve inzichten, intuïties, ingevingen en voorgevoelens behoren ertoe." [Tacit knowledge is personal knowledge that is difficult to formalise and therefore hard to share with others. It includes subjective insights, intuition, hunches and gut feelings (*own translation*)][273]

The category "experience" includes knowledge the collection of personal knowledge accumulated through past experiences. This collection of internalised knowledge is considered to be the source of our "gevoelens, associaties, fantasieën en intuïties" [feelings, associations, fantasies and intuitive thoughts (*own translation*)].[274] All the information that one internalises or remembers (sometimes imperfectly or in a distorted manner) naturally becomes part of this collection of experientially acquired knowledge. This category roughly equates with what Nonaka calls the cognitive elements of the phenomenon of tacit knowledge, that "refer to an individual's images of reality and visions of the future."[275]

The "skills" category includes the repertoire of cognitive skills that a person uses to understand and use the explicit knowledge that confronts him/her in the form of new information.[276] These more or less concur with Nonaka's technical elements of the phenomenon of tacit knowledge that "includes concrete know-how, crafts, and skills."[277]

Lastly, the "attitude" category refers to the values and beliefs that influences how a person acts on the information with which he/she is confronted.[278] Once again it is derived from Nonaka who says that "knowledge, unlike information, is about *beliefs*

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[273] Weggeman. *Kennismanagement*: 34.

[274] Weggeman. *Kennismanagement*: 34.

[275] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 60.

[276] Weggeman. *Kennismanagement*: 34.

[277] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 60.

[278] Weggeman. *Kennismanagement*: 34-36.

and *commitment*. Knowledge is a function of a particular stance, perspective or intention."[279]

Taken together, experience, skills and attitude are examples of embodied and therefore person-dependent knowledge that can only be shared through face-to-face socialisation. The only alternative is to convert these forms of tacit knowledge through the process of externalisation into explicit knowledge before it can then be communicated as information.[280]

The reason for this particular view of the phenomenon of tacit knowledge seems to be the fact that thinking about the nature of knowledge in knowledge management theory predominantly took place against the intellectual backdrop of information science theory.[281] Subsequently, reflection on the concept of knowledge took place in a context that was dominated by an already defined concept of information as packaged data. This leads, firstly, to the assumption that information is something that is measurable and quantifiable, while knowledge is in part the cognitive skill for assessing, interpreting and using information. Secondly, it results in a kind of conceptual inertia whereby information is thought of in terms of packaged data, and knowledge, in turn, is thought of in terms of (value added) information. The result is that the capacities ascribed to knowledge are defined from the concept of information. Knowledge becomes information plus a mystical quality. In this context the distinction between tacit and explicit knowledge became a conceptual tool for qualifying the difference between information and knowledge. Thus knowledge is equated with tacit knowledge and by implication explicit knowledge is equated with information

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[279] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 58.

[280] Weggeman. *Kennismanagement*: 34.

[281] Stacey. *Complex Responsive Processes in Organization*: 15.

1.3 A COMMUNICATION MODEL FOR TACIT KNOWLEDGE

The view of tacit knowledge as a category for those things that cannot be easily transformed into and communicated as information is concurrent with a sender-receiver model of communication. The basic communication situation is conceived of as the exchange of information between individual actors. As Stacey points out, "it posits a sender-receiver model of knowledge transmission in which individual A sends some kind of signal to individual B, who receives it."[282] If one uses this communication model as assumption, then Nonaka's SECI-model could fit into the logic of the information processing paradigm – the same information processing view of organisation which Nonaka's theory of knowledge creation was designed to oppose.

Tacit knowledge, which is in the head of an individual, has to be converted into explicit knowledge (externalisation), before it can be directly communicated. Once converted, the resultant explicit knowledge can then be packaged in symbolic form (information) and transmitted from one individual to another. As soon as the message arrives, the receiver has to unpack the information, using the tacit knowledge in his/her head to interpret the explicit knowledge confronting him/her.[283] Assuming that the receiver has the appropriate base of tacit knowledge (cognitive skills, contextual understanding) to understand the message, the relevant part of the information will then be explicit knowledge to the receiver and in understanding or using this explicit knowledge, the receiver internalises it and thus updates his/her individual tacit knowledge.

Whilst this model of communication could be deemed compatible with Nonaka's SECI-model, the concept of tacit knowledge is used somewhat differently in knowledge management theory than in Nonaka's knowledge creation theory. If one considers Nonaka's theory as an extension of the dynamic capabilities approach, then the concept of tacit knowledge firstly functions as a placeholder concept for the

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[282] Stacey. *Complex Responsive Processes in Organization*: 15.

[283] Stacey. *Complex Responsive Processes in Organization*: 16-17.

subjective, unstructured realm of human creativity that is the *wellspring* of all new knowledge. In terms of the communication model described here, the concept of tacit knowledge functions as a type of knowledge *content* that cannot be readily communicated.

The attributes ascribed to the concept of tacit knowledge in terms of the sender-receiver communication model are not incompatible with Nonaka's theory – and might very well have been latent in the SECI-model – but these attributes relate to the secondary and not the primary concern in Nonaka's theory. In other words, using the concept of tacit knowledge to theorise the concept of knowledge in terms of an information paradigm, may well be feasible on the basis of the SECI-model (of the interaction between different types of knowledge), but such a conceptualisation makes it impossible to explain the generation of *new* knowledge.

If the function of the concept of tacit knowledge in post-Nonaka knowledge management theory is compatible (although not in accord) with Nonaka's theory, then it is wholly incompatible with Polanyi's conception of tacit knowledge. In the chapter on Polanyi it was argued that, when using the concept of tacit knowledge in the way Polanyi intended it, one cannot convert tacit knowledge into explicit knowledge, nor can one package the content of tacit knowing into bits of information in order to transfer it.

The real issue is not whether or not the *phenomenon* of tacit knowledge is convertible or not. In the case of Nonaka and post-Nonaka knowledge management theory, the phenomenon of tacit knowledge is thought of as referring to some or other cognitive *content*. One could conceivably disagree with Nonaka and argue that (at least some) tacit knowledge cannot be converted to explicit knowledge. In other words, one could hold that there are categories of tacit knowledge content that can never be articulated. But as far as the phenomenon of tacit knowledge is thought of as *content*, such a position would still be closer to Nonaka and knowledge management theory interpretations of the phenomenon of tacit knowledge than to Polanyi.

In terms of Polanyi, tacit knowledge cannot be converted into explicit knowledge. *Not* because of an inherent quality that defies articulation, but because it is not properly the *content* of knowing. The concept of tacit knowledge, in terms of Polanyi's understanding, refers to the *structure* of knowing. This means that it does not exist without an integrative *act* of the knower. Tsoukas views attempts to articulate tacit knowledge as suggested by Nonaka's mode of externalisation as a practical impossibility.

> Nonaka and Takeuchi's interpretation of tacit knowledge as knowledge not-yet-articulated – knowledge awaiting for its "translation" or "conversion" into explicit knowledge, an interpretation that has been widely adopted in management studies, is erroneous: it ignores the essential ineffability of tacit knowledge, thus reducing it to what can be articulated.[284]

The sender-receiver communication model, which seems to be invariably assumed in post-Nonaka knowledge management theory, is not compatible with Polanyi's conception of tacit knowledge as an act of integration and with his views on ineffability. Meaning can only be produced at the moment of the act of integration when the subsidiary particulars are integrated into a meaningful whole. It has been argued in chapter two that the building blocks of language – the vocabulary, grammar, even the pronunciation – function during communication as part of a bigger set of subsidiary particulars. This bigger set of subsidiaries include the past experiences of the receiver, along with his/her values, cognitive skills, etc. To produce meaning, all of these things have to be integrated into a meaningful whole by the receiver. The meaning is therefore not packaged in the content that is being communicated. The phenomenon of communication cannot properly conceived of as knowledge transfer, because knowledge as such cannot be transferred, it has to be *integrated* from the subsidiary particulars available to the knower. Hence, Polanyi's use of tacit knowing as an integrative act, is not only incompatible with the sender-

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[284] Tsoukas. Do We Really Understand Tacit Knowledge?

receiver communication model, but also incompatible with the idea of knowledge transfer that is prominent in knowledge management theory.

1.4 BRIDGING THE EPISTEMOLOGICAL GAP

It is one thing to reduce knowledge to the category of tacit knowledge, but combined with the sender-receiver model of communication, this category of knowledge is relegated to the head of the individual. As was the case with Nonaka, tacit knowledge remains a black box. What is more, it prevents thinking about the difficult part of knowledge dynamics, namely the question of knowledge generation itself. This raises the question of whether, in the case of post-Nonaka knowledge management theory, the concept of tacit knowledge is performing any function other than obfuscation?

If for all practical purposes the concept of tacit knowledge boils down to 'not-information' and explicit knowledge to 'information' – then one has to ask why the concept is used at all. It seems that in much of knowledge management theory the distinction between tacit and explicit knowledge is just a convoluted way of stating the common language distinction between knowledge and information. Could it be that in those knowledge management theories and models where the conflation of knowledge with tacit and information with explicit is complete, a form of information management is parading as knowledge management?

Even so, the question remains what of specifically the concept of tacit knowledge attracted the authors who employed it. In other words, what were the environmental factors that pushed these writers into incorporating the concept of tacit knowledge into the information processing framework?

The following section will argue that the prevalence of the concept of tacit knowledge in post-Nonaka knowledge management theory could be interpreted as an epistemological stop-gap measure.

Spender identifies the epistemological problem facing knowledge management when he argues that most theories of organisational knowledge do not "challenge the epistemological limits of scientific knowledge, [n]or do they seem adequate to a theory of knowledge management."[285] In this context the theory of Nonaka and its adapted form of Polanyi's epistemology provided some form of epistemological foothold. Spender is one of the knowledge management theorists who turned to the concept of tacit knowledge as the basis for a knowledge management epistemology: "While objective knowledge is similar to science – abstract and independent of the knower – tacit knowledge is subjective and intimately tied up with the knower's experience."[286]

The orthodox philosophical discourse on the nature of knowledge was mostly limited to scientific knowledge. Fittingly the traditional epistemological concerns were the nature, sources and validity of knowledge. Hence, the epistemological discourse raises questions about the scope and limits of knowledge, and about the method and criteria for the justification of knowledge. These concerns of philosophy do not always concur with the epistemological demands of knowledge management theory, as noted by Schreinemakers and Essers.

> Corporate knowledge management is primarily directed towards the pragmatic objective of finding principles that may ensure the successful application and utilization of knowledge, an objective that has not been at the forefront of modern philosophical attention.[287]

In contrast to science and philosophy with its objective of grounding knowledge in justified true belief, knowledge management deals with knowledge as a

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[285] Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications: 58.

[286] Spender. Competitive Advantage from Tacit Knowledge? Unpacking the Concept and Its Strategic Implications: 58.

[287] Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management: 26.

commodity[288] or as a factor of production. The focus does not fall exclusively on scientifically reliable knowledge, but on increasing the productivity of knowledge in organisations. Productivity in this case means the capacity for value creation through organisational action.

> Corporate knowledge management has to work with the actual beliefs and commitments of organisation members, whether or not they are true or scientifically respectable.[289]

This shift in the meaning of knowledge leaves knowledge management theory with a need for a broader *theory of knowledge* - not merely knowledge as justified true belief, but knowledge as a capacity for organisational action.

One way to provide some sort of linkage, between the narrow concept of knowledge in the traditional epistemology and the broader role of knowledge as a capacity for action, is to relinquish the idea of objective knowledge. The result is an emphasis on - or a rebalancing toward - subjective knowledge and the recognition, echoing Nonaka, that ultimately "knowledge is context-specific and relational."[290] Hence, the concept of tacit knowledge becomes the way to link knowledge with action.

If knowledge is understood as a framework for evaluating and incorporating new information, then action is in turn understood as "a choice that is made on the basis of knowledge." [291] This choice is conceived of as a decision which is made on the basis of evaluating the (knowledge of) the consequences of each option. All of this is assumed to take place inside the head of an individual agent.[292] Hence, knowledge and action are linked, but linked inside the mind of the individual agent/actor. From

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[288] The substantial changes to the role of knowledge in society eventually impacts on the relation between that which is known and the subject that knows it. The transformation of this relationship as the commodification of knowledge is described by Lyotard. See, Lyotard, JF. 1984. *The Postmodern Condition: A Report on Knowledge*. Manchester: Manchester University Press: 4-5.

[289] Schreinemakers and Essers. Nonaka's Subjectivist Conception of Knowledge in Corporate Knowledge Management: 26.

[290] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 59.

[291] Stacey. *Complex Responsive Processes in Organization*: 17.

[292] Stacey. *Complex Responsive Processes in Organization*: 17.

there Nonaka's recognition that "knowledge is essentially related to human action"[293] and that ultimately it is individuals who act.

Turn this insight around and a knowledge perspective becomes a management tool. Whereas human resource management normally focussed on human *behaviour*, the concept of tacit knowledge becomes a way to explain (and possibly manage) behaviour via *cognition*.[294] On the one level this shift in emphasis can be seen as a knowledge management reinterpretation of human resource management. The concept of tacit knowledge then simply serves as a way of arguing that *people* matter to the organisation, even in the face of radical technological advances. The tacit knowledge bases of the individual employees – encompassing tacit knowledge content as well as tacit skills – collectively embody the human resources of the organisation.

On another level, it makes it possible to root knowledge in *practices* and thus provide a non-hermeneutic explanation for human behaviour. Defining knowledge in terms of action is the closest that knowledge management theory comes to Polanyi's conceptualisation of tacit knowing as an act of integration. Essentially it involves grounding cognition and knowledge in human practices. Taking the example of Polanyi's argument concerning scientific knowledge as reliant on a whole host of background practices. These practices are not open to direct scrutiny, because they are a mixture of skills and presuppositions, and the structure of skill is such that it breaks down as soon as it is reduced to its constituent parts during analysis. Thus grounding all knowledge in practices, Polanyi 'solves' the epistemological problem.

In a similar way, the concept of tacit knowledge functions as a feigned epistemological answer in knowledge management theory. Referring back to the epistemological gap that faced knowledge management theory at a particular point,

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[293] Nonaka and Takeuchi. *The Knowledge-Creating Company*: 59.

[294] Kinghorn argues (with reference to Sensemaking theory) that there has been a shift in the focus of management thinking from behaviour to cognition. See, Kinghorn, J. 2002. Understanding Organizational Sense Making: A Diagnostic Tool for Strategic Leadership in Conditions of Complexity, in Leibold, M, GJB Probst, and M Gibbert (eds.), *Strategic Management in the Knowledge Economy*. London: Wiley: 322.

the concept of tacit knowledge makes it possible to talk about knowledge in terms of practices. This deferment of the epistemological problem away from questions of knowledge to questions of practice, means that cognition is often thought of in terms of behaviour. It appears as if in some instances the concept of tacit knowledge functions as epistemological prevarication – in other words it is a means to *escape* the epistemological problem faced by knowledge management theory.

Escaping the epistemological problem in this way might have been feasible, provided that the concept of tacit knowledge is used strictly in the way that Polanyi conceptualised it. But, as soon as it is used to signify knowledge content that cannot be communicated as information (as it has been shown is the case post-Nonaka knowledge management theory), the concept of tacit knowledge becomes shorthand for knowledge *content*, rather than the integrative skills that is the *structure* underlying knowledge. This has the unfortunate consequence of putting all the epistemological questions back on the table. Then all the questions about the extent and reliability of explicit knowledge content, also holds for the tacit knowledge content. It seems then as if the concept of tacit knowledge – at least in the way it is currently being employed – fails to properly bridge the epistemological gap. The concluding section will argue that this epistemological gap facing knowledge management theory cannot be bridged without a shift in ontology.

1.5 Ontology in Review

Although Nonaka's SECI-model and the distinction between tacit and explicit knowledge enjoyed the status of the almost default epistemology in knowledge management theory for a period, the epistemological shortcoming outlined above caused it to be increasingly challenged by other approaches to the phenomenon of organisational knowledge. In last few years there has been an increasing interest in alternative theoretical resources. Stacey links this interest in alternative theories with

the most basic assumptions of mainstream knowledge management theory – signalling an ontological rather than epistemological discomfort.[295]

Thinkers who were uncomfortable with the representational character of the epistemology of the information paradigm, turned to *autopoiesis* theory as the basis of epistemology.[296] The notion of mental models is a good example of representational thinking in that it assumes that a representation of the external reality is somehow stored in the brains of the individual agents as a mental model. Von Krogh, Roos and Slocum argue against this view, rather opting for an *autopoietic* view of the brain that suggests that "the world is not a pre-given state to be represented, but rather that cognition is a creative act of bringing forth a world."[297] In opposition to the orthodox view, *autopoiesis* holds that reality is constantly and actively created (or enacted). One of the important implications that this change in ontology has for the epistemology of knowledge management theory is that information has now to be thought of in terms of self-referentiality. Turning data into information is now dependent on a process of interpretation. In other words, information can no longer be seen as person-independent or objective and therefore can no longer be treated as a substance that can be packaged as a message and communicated between a sender and a receiver.[298]

A second assumption that is the cause of theoretical dissent is the idea, derived from Nonaka, that the source of new knowledge is in the mind (tacit realm) of the individual.[299] In response to this writers looked towards the theory of organisational *sense-making*, as it emphasises the *socially* constructed (enacted) nature of reality.[300] [301] Stacey argues that sense-making challenges the mainstream knowledge management theory assumption that there is a clear distinction between tacit and explicit

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[295] Stacey. *Complex Responsive Processes in Organization*: 29,33-38.

[296] Stacey. *Complex Responsive Processes in Organization*: 30.

[297] Von Krogh, Roos, and Slocum. An Essay on Corporate Epistemology, (eds.): 58.

[298] Von Krogh, Roos, and Slocum. An Essay on Corporate Epistemology, (eds.): 59.

[299] Stacey. *Complex Responsive Processes in Organization*: 30-31.

[300] Weick, K. 1995. *Sensemaking in Organisations*. London: Sage

[301] Kinghorn provides an overview of the increasing popularity of organisational sensemaking. See, Kinghorn. Understanding Organizational Sense Making: A Diagnostic Tool for Strategic Leadership in Conditions of Complexity.

knowledge and that explicit knowledge has priority.[302] This is because *sense-making* holds that people *enact* reality as they interact with one another.

But in Stacey's assessment, both *autopoiesis* and *sense-making* theory still implicitly assume the split between the individual and social levels of analysis and the causal framework that underlies the information processing paradigm.[303] In other words, the ontological shift is incomplete and as a consequence both *autopoiesis* and *sense-making* are still subject to the limitations that the split between subject/object place on thinking about knowledge creation in organisations.[304] What is needed in order to theorise organisational knowledge creation is an ontology that avoids the split between the individual and social levels and that incorporates a notion of causality that can accommodate self-organisation. Stacey proposes *Complex Adaptive Systems* theory as the basis of an ontology that can conceptualise the "evolution of knowledge as participative self-organisation."[305]

Exactly how complexity theory helps to understand organisational knowledge creation is not at issue. What is, however, of interest is the fact that a number of authors in knowledge management theory are looking towards complexity theory to provide insight into the problem of knowledge creation. Some commentators are of the opinion that knowledge management theory is moving into a next generation – one that is no longer dominated by Nonaka's epistemology.[306] Snowden writes:

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302 Stacey. *Complex Responsive Processes in Organization*: 37.

303 Stacey. *Complex Responsive Processes in Organization*: 38-39.

304 Stacey. *Complex Responsive Processes in Organization*: 39.

305 Stacey. *Complex Responsive Processes in Organization*: 218.

306 Firestone, JM and MW McElroy. 2003. The New Knowledge Management; Snowden. Complex Acts of Knowing; Tuomi, I. 2002. The Future of Knowledge Management, *Lifelong Learning in Europe* VII/ 2.

> We are reaching the end of the second generation of knowledge management, with its focus on tacit-explicit knowledge conversion. Triggered by the SECI-model of Nonaka, it replaced a first generation focus on timely information provision....The third generation requires the clear separation of context, narrative and content management and challenges the orthodoxy of scientific management.[307]

This challenge to the orthodoxy of scientific management is an ontological one, as Snowden draws on complex adaptive systems theory to build a model for managing contexts and identifies "the natural flow of knowledge creation."[308]

It is thus possible to identify a definite movement away from the concept of tacit knowledge and the ontology of the information processing view of organisations that appropriated the concept. In recent years increasing numbers of knowledge management theorists have been looking at frameworks with radical ontologies – such as *autopoiesis*, sense-making and complexity theory – specifically to address the issue of knowledge creation.[309]

To conclude: the way in which the concept of tacit knowledge has been appropriated into post-Nonaka knowledge management theory, by merely deferring the problem of knowledge creation to the level of the individual, did not address this fundamental issue. It therefore seems that knowledge management theory that aims to address knowledge creation, rather than knowledge processing, has to look further than the concept of tacit knowledge. The recent trend in the direction of complexity theory suggests that the epistemological challenge facing such a knowledge management theory can only really be addressed if the ontological dimension is also taken into account.

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[307] Snowden. Complex Acts of Knowing: 1.

[308] Snowden. Complex Acts of Knowing: 12.

[309] Snowden. Complex Acts of Knowing; Von Krogh, Roos, and Slocum. An Essay on Corporate Epistemology, (eds.); Weick. *Sensemaking in Organisations*.

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